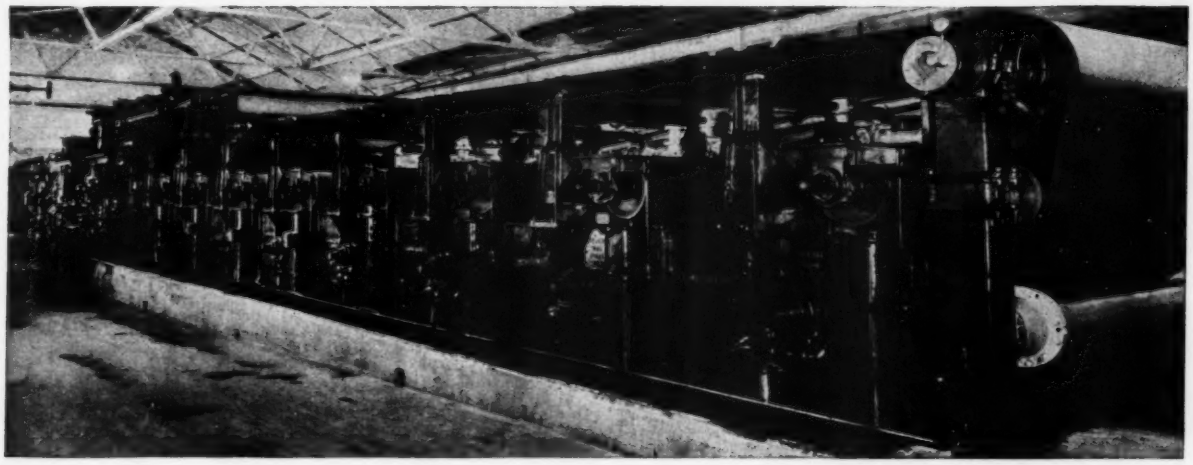
WHY BELOIT SUCTION DRUM ROLLS ARE SUPERIOR TO ALL OTHER SUCTION DRUM ROLLS



Alton Box Board & Paper Co., No. 1, 145-inch Machine.

These Features are Distinctly BELOIT Features

1. **Unusually Wide Suction Area Without Increasing Power to Operate Roll.**
2. **Drilling That Produces Uniform Vacuum Distribution.**
3. **Strength to Resist Felt Pull.**
4. **Extra Heavy-Duty Roller Bearings.**

The fine results of recent installations, responsible for several repeat orders, prove BELOIT Rolls are vastly different from small suction Drum Rolls with narrow suction box previously used in most board mills

The Beloit Way BELOIT IRON WORKS PAPER MACHY BELOIT WIS **is the Modern Way**

ADVERTISING PAGES REMOVED

THE PAPER INDUSTRY

AUGUST, 1935
Vol. 17—No. 5

A MONTHLY EDUCATIONAL JOURNAL
Devoted to the Interests of the Pulp and Paper Industry

LEADING ARTICLES

Esparto Papers ..... *Vincent S. Smith* 315
Carbon Tetrachloride for Cleaning Wires and Felts..... *H. B. Richmond* 318
A Summary of the Research Work of the Experimental Paper Mill of the National Bureau of Standards.... *Merle B. Shaw* 319
Proper Motoring Pays..... *H. M. French* 326
Finishing Room Problems..... *J. G. Weiner* 327
Summer Meeting of Canadian Technical Section..... 330
Sheet Machine Design Considerations..... 333
The Norwegian Pulp and Paper Industry..... 334
Things to Consider in Selecting Gears..... *W. W. Sayers* 335

REGULAR DEPARTMENTS

Editorials 299-300
Current Thought 302
Paper Sketches 329
New Publications 339
Opportunity Section 340
Safety Contest Scores..... 345
Power 347
Technical Developments ... 349
Papermaking Patents 355
Commercial Outlook 359
Domestic Raw Materials... 361
Imports and Exports..... 363
Advertisers' Classified Index 365
Index to Advertisers..... 369

EDWARD B. FRITZ, Publisher
A. SCOTT DOWD, Editorial Director
HARRY E. WESTON, Editor

PUBLICATION OFFICE
Chicago, Illinois
333 N. Michigan Ave.
Dearborn 8877

Eastern Office
New York, N. Y.
342 Madison Ave.
Murray Hill 2-7358

Pacific Coast Office
Los Angeles, Calif.
1031 S. Broadway
Westmore 8501

Entered as second-class matter at the Post Office at Chicago, Illinois, February 13, 1920, under the Act of March 3, 1879. Subscriptions in the United States, Alaska, Hawaii, Philippines, Porto Rico, Cuba and Mexico, $2.00 per year. Canada, $2.50 per year. Other countries, $3.00 per year.

Copyrighted 1935 by Edward B. Fritz, Publisher.

FOR STOCK PUMPS IN THE PAPER INDUSTRY USE

ODORLESS TASTELESS STAINLESS **KLERO** PACKING
REG. U.S.A.M. PAT. OFF.

It is imperative that a packing working on Stock Pumps and Jordans contain no graphite, or other objectionable substances used in compounds of ordinary packings that would work their way into the stock being pumped, thus spoiling the finished product. Particles of graphite may accidentally get into the stock and spot up the pulp or paper with tiny black specks.

"Klero" eliminates this hazard, as it contains no graphite. The body of "Klero" is a high-tensile-strength cotton, with a lubricant that is colorless, odorless and tasteless.

SEND FOR ILLUSTRATED FOLDER

Put up in 2 and 5-lb. Boxes.

Why not let us send you free working sample to test out under your own working conditions?
STATE SIZE REQUIRED.

GREENE, TWEED & CO., 109 Duane St., NEW YORK
Sole Manufacturers

Permanent Industrial Recovery

AT THIS writing, we are in the mid-summer season. It is a vacation period with more people taking vacations than in any previous five years. Business should be slack. Industry should be quiet. On the contrary, all trade reports show that July was a busy business month.

Steel, that steady old barometer of trade, did the most remarkable upturn in its whole checkered career. After reaching a 54½ per cent of capacity in the spring, it sank to a 30 per cent low in latter May and the beginning of June, only to turn about and climb weekly to a 46 per cent capacity in the last week of July. Nothing on earth could produce this record except the definite upward swing of the long pull economic recovery.

Then, witness the phenomenally high activity of that bellwether of returning business recovery, the automobile industry, weekly production in July running over 20,000 units per week more than in July, 1934. Here is what a commentator on that situation says: "Retail sales of automobiles are holding up so well that the manufacturers are forced to delay work on new models."

Turn to the Durable Goods division. "In the first six months of 1935, the plate glass industry produced 88,000,000 square feet against 48,000,000 square feet in the first six months of 1934."

Again, one of the best indications of this change for better business ahead is the increase in new orders for machine tools. Orders for machine tools received in June were at the highest levels since 1930 and above the fifteen year average for the industry.

These indices of increased activity in the Durable Goods division of industry are significant because it is in this branch that most unemployment exists.

And the paper industry is making its contribution and revealing its increase also. In some divisions, paper production based on orders received, is running 70 per cent of capacity for the first six months of the year against an average of 60.5 per cent of capacity for the corresponding period in 1934.

Last week, announcements were made of the placement of a six million dollar order for new paper machines and mill equipment—the first large order for paper mill equipment to be placed in five years.

Nothing reflects the wide-spread change of conviction throughout the country among all classes of commerce and industry like the action of the stock and bond markets during the last four months. With an unprecedented mass of cheap money earning no interest and bearing down the interest rates and thus forcing investment funds into speculative channels, the public interest in the stock market is increasing daily as the increased volume trading lifts the prices of good stocks to higher levels.

The reports from New York are that the buying of stocks represents sound investment,—purchases for the long pull rather than margin trading. The cables also tell of the constant expanding interest abroad in American securities. Volume orders from foreign markets have contributed to swelling the sales total.

Business is on the permanent up and up.

The Brookmire forecast states that the signs of recovering business leading into a veritable boom will be

1—Expanding Durable Goods market
2—Rising commodities
3—Bull stock market

All three of these indices are actively in evidence

to-day. We agree with the market prophets that this fall will see substantial permanent industrial recovery, despite the gyrations of the "man on the flying trapeze" at Washington.

Esparto Fiber

IF YOU were asked as one familiar with the paper-making industry the name of the common fibers that find their way into a sheet of paper, would you at first thought include esparto in your list of fibers? If you would, it is probable that your experience has been broader than that given by the mills of the United States and Canada, and even some of the other important paper-producing countries of the world—to the British paper industry esparto is a paper-making fiber of no little importance.

So far as is known, however, esparto is not being used commercially in the manufacture of paper within the United States, therefore, some information about it should prove interesting to our readers. Such information is included in an article in this issue under the title of "Esparto Papers." This article, although non-technical in character, reveals some rather interesting facts about the fiber, its paper-making characteristics and the treatment necessary to pulp it.

Machine Erection

HAVE you ever aided in the erection of a complete paper machine or watched the progress of others that were making such an installation? If you have done either of these two things, you cannot help but be appreciative of the need for precision and accurate workmanship all along the line.

The real test, however, comes when the installation has been completed and it is time to put the machine into operation. What anxious moments are they for the management that has invested a large sum for the machine, for the machine manufacturer who built it, and for those who were responsible for its design and installation. Will the machine do that which was anticipated of it? Will it start up without a hitch or with only minor adjustments or will there be trouble that can only be located with difficulty or overcome at considerable expense? How long is it going to take to get a satisfactory sheet over the wire, through the presses, over the dryers, through the calender stack and what is most important into a satisfactory roll on the reel?

What a relief it must be to the paper manufacturer, and to the machine builder and designing engineers to see a new machine go into operation without any unusual difficulties. What a thrill it must give the erecting force and the crew that is operating it to see the machine start up smoothly.

Probably no where in a paper mill would there be quite as much anxiety over the starting up of a new machine as in the case of a paper machine. Yet, no individual piece of equipment throughout any plant can perform at its best unless properly installed. Some little bit of carelessness in making an installation may make a very inefficient piece of equipment out of a machine that would otherwise prove most satisfactory.

Every machine installation should be made correctly and only then can proper results be expected.

Have a Date With T. A. P. P. I.

THE annual fall meeting of the Technical Association of the Pulp and Paper Industry is only a few weeks away. It is scheduled for September 18-21, the first day being spent in Philadelphia, Pa. and the remaining days at the Ambassador Hotel in Atlantic City, the convention headquarters.

The day in Philadelphia with the concentration point at Hotel Pennsylvania is to permit plant visitations as well as visits to other points of interest. Among the points of interest is the site of the Rittenhouse mill, the first paper mill in the original thirteen colonies, and, for that matter, the first paper mill on the North American continent. It is a spot that should be close to every American papermaker, so do not miss it if you spend the day in Philadelphia and have never had the privilege of viewing it before.

It is believed that the time spent there will be stimulating and will give you a fuller and better appreciation of the part that paper has played in the development of our country, what it is now playing, and what may be its role in the future.

Several of the papers scheduled for presentation at Atlantic City have been arranged to cover two of the most fundamental of subjects to papermakers—the cellulose fiber and the principle governing the formation of a sheet of paper. In addition, a number of other papers of specific interest have been arranged for. All in all it looks like a well-rounded out program in which there is suitable balance of both technical and entertainment features.

It might be well, if you haven't already done so, to make arrangements to attend this convention. Have a date with T.A.P.P.I. on September 18-21 and see for yourself just what a pleasant and profitable time you will have.

DIAMOND PRODUCTS

●

58% SODA ASH

BICARBONATE OF SODA

76% CAUSTIC SODA

CARBON TETRACHLORIDE

DIAMOND SODA CRYSTALS

MODIFIED SODA

SPECIAL ALKALIES

LIQUID CHLORINE

DIAMOND ALKALI CO.

Pittsburgh and Everywhere

ALKALI

ADVERTISING PAGES REMOVED

CURRENT THOUGHT

Quoting Mr. Ford

By WILLIAM SIBLEY

IN a recent issue of the *New York Times Magazine* there appeared an unusually interesting and illuminating interview with Henry Ford on the subject of how to "share-the-wealth." This is so timely, and Mr. Ford's remarks so lucid, that I am taking the liberty of dedicating my page to his trenchant remarks.

"What do I think of the share-the-wealth project? . . . There is nothing new to it. It has been proposed over and over again and always given up as impracticable. . . . The only trouble is that most people who suggest it are not sincere and know they are not. . . . The minute you hear them talking about sharing the wealth you hear them begin to talk about money. There is where the great hitch occurs. They go around making speeches leading people to imagine that it is a comparatively easy thing to get all the money and divide it. What they do not explain to their audiences is the fact that money is not wealth.

"Money . . . may represent wealth, but it is not wealth itself. Take this company. Everyone knows it is a wealthy company. What does its wealth consist of? Money? Certainly not. Its wealth is made up of productive plants, machinery and the rest of the things that go with them.

"What would the people who propose to share the wealth do with an organization such as ours? Should the machinery be confiscated and divided among those who have no machinery? Or should the plant be taken over and run by a bunch of theorists and politicians? How long do you think it would last under such conditions? . . . If on the other hand they propose to share the wealth by excessive taxation, where will the money come from during off years, such as some that have just passed, when all large organizations are compelled to fall back upon their surpluses? In one year we circulated a great many more millions than we took in. Had taxation eaten up our surpluses we would have had to borrow money to go along.

"Industry can look after itself and is the most effective mechanism for sharing the wealth. By industry I mean the market to which people bring what they have and secure that which they need. It is the center where materials, labor, skill and science are changed into useful commodities of life.

". . . The position of the wage earner determines the country's welfare. If the worker cannot buy, it does not matter who else does or who does not. No other class has any economic importance. The whole secret of economic stability depends upon a useful day's work for a proper day's pay.

"The only way we can have production is by sharing it and the only way we can share it is by having it. Codes do not produce proper wages. The only thing they did do was to protect backward business in antiquated and inefficient methods. By efficiency in workmanship, selection of materials, management and design industry can provide good wages and help in the distribution of wealth.

". . . it is only by the exchange of benefits that profit can exist. It is only in finance that one man's gain is another man's loss. Customer, maker of the product and manufacturing plant all must profit. That is what happens in honest industry. The customer gets creative labor transformed into some utility of living. What he buys is worth more to him than what he pays for it. The maker of the product gets his share in wages or salary, and the third share goes to the manufacturing plant, which for the sake of its customers as well as for its employees must be kept up to date and efficient. The surpluses created in busy times must be used to tide over periods of adversity. This is the ideal condition, and were it universal, then wealth would be shared.

"Unfortunately, some industries are so involved in huge borrowings that money which should find its way back to the customers in the shape of improved goods or to the workers in the form of wages, goes out in interest. This, of course, is a barrier to wealth-sharing. But faults such as these are corrected almost automatically. Too great profits show up in high prices and a decrease in selling results. Low wages lead to labor troubles or poor work, and the sales also drop off.

"Large fortunes do not continue to exist unless they are profitably employed. When I use the word "profitably" I use it in its true sense. Comparatively few large fortunes which have been inherited have remained long in the possession of the heirs. Those that have were bequeathed to people who knew how to work and how to save their wealth.

"There are always two of everything in the world and that being so there is bound to be competition and no laws can prevent it. It is lucky that they can't. This world was built to develop character, and healthy competition is one of the principal agents in doing this. . . . That is the reason why I am so optimistic about things in general. The outlook is good in spite of the crowd in Washington. There is more work to be done than there ever was. People expect more and expect to do more. . . . Men were born with two feet and they have to stand on them. The only charity I know is paying people fairly for what they do."

If you publish an internal house-organ for the benefit of your personnel, might I suggest you show Mr. Ford's remarks to your house organ editor. He may want to use some of them in his next issue.

THE PAPER INDUSTRY
A MONTHLY EDUCATIONAL JOURNAL

Esparto Papers

VINCENT S. SMITH

THE use of esparto grass in the manufacture of paper is peculiar to British papermaking, yet the many printing and writing grades produced from this grass have a world-wide reputation.

Briefly, the introduction of esparto into Great Britain was due to the need for additional papermaking materials, an urgent necessity which became manifest about the middle of the last century. At that period, the education of the common people was spreading rapidly, consequently there was a greater demand for books and papers. At the same time, the many excise duties placed upon papermaking and newspaper production were gradually disappearing. These concurrent movements ultimately proved that the available rags, then practically the only papermaking materials, were inadequate to meet the demand.

Efforts were made in many directions to meet this need, and about 1857 George Routledge conceived the idea of utilizing esparto grass. After overcoming initial difficulties, his experiments were successful and many papermakers were quick to realize the utility of this new fiber.

Unfortunately, the manufacturing process included the use of chemicals, which, having passed through the process, were polluting rivers and streams to such an extent that eventually the authorities had to intervene. For a time, it seemed that the esparto experiment would prove a failure. Ultimately, the splendid work of mill engineers saved the situation by the introduction of effective recovery methods which not only led to considerable economies but placed esparto grass permanently in the field of papermaking, and, for the moment, met the greater call for paper.

Despite the introduction of wood pulp some ten years later, the annual consumption of esparto grass in papermaking has been, and still is, steadily on the increase. At present, 300,000 tons of this grass are imported into Great Britain annually for this purpose alone.

The grass is obtained chiefly from Northern Africa, where it grows wild, and from Southern Spain, where it is cultivated, the latter proving to be the better grade on account of offering greater strength and finer color, also having better bulking and bleaching qualities. The full growth of the plant leaf is between six and eight inches, and when it reaches maturity, it takes on the appearance of wire, due to the propensity of the grass blade curling in cylindrical fashion. Native labor is employed in its collection, particular care being taken to avoid lifting the plant by its roots; actually it is gathered by plucking.

Following a preliminary drying in the sun and picking to extract useless material, the grass is carried to the collecting centers. Here it is packed into bales of about 400 pounds, compressed or loosely bound with esparto ropes, and shipped direct to the mills in England and Scotland.

The majority of the mills using this fiber are situated in Scotland, although during recent years some mills in England have turned to esparto. These mills were located in the north of the British Isles mainly due to the fact that this is the center of the British chemical industry, the proximity of the two industries offering definite economies. A further important reason is that of water supply. It is essential for an esparto mill to have a constant supply of water which is as free as possible from hardness and organic matter. The streams of Scotland offer this advantage while the Scottish ports are also the calling stations for the chemical industry supplies.

On the arrival of the grass at the mills, the first process is that of cleaning. The bales, therefore, are opened, and the grass subjected to willowing. For this purpose a simple machine is employed. This is

Courtesy The Association of Makers of Esparto Papers

Upper left—Women hand-picking esparto

Upper right—Esparto being dried in the sun previous to baling. New presses being erected

Left—Press for pressing esparto into bales

Right—Finishing the tying of an esparto bale. Press in background

a grass duster which is a conical-shaped machine with a rotating drum inside, all constructed of metal. Both the outer casing and the rotating drum have metal teeth which cause the bunches of grass to be opened. On the under side of the casing there is an open gridwork, below which suction is applied from a high power fan which draws the dust out of the grass.

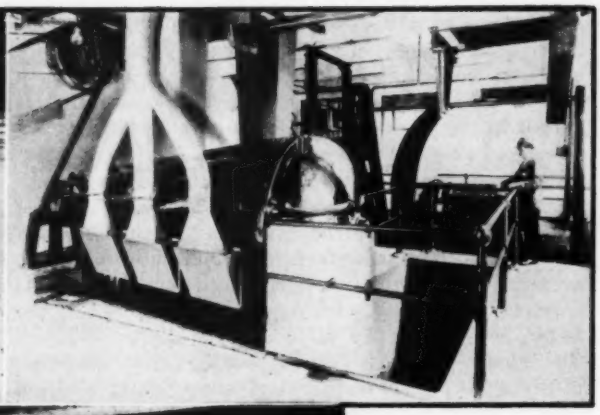
From this machine, the grass travels by means of a belt to the boilers or cookers. At one time, it was the practice for girls to stand on either side of the belt and watch for root ends and other undesirable materials, but this practice is not now so general, later processes of screening being relied upon.

The type of boiler usually adopted is Sinclair's Vertical Vomiting boiler in which 2 to 5 tons of grass are boiled at a time in 15 to 17 per cent caustic soda. The boiling lasts from 4 to 6 hours under a pressure of 40 to 60 pounds. For longer boils, less pressure and a smaller percentage of caustic soda are used. In some mills, boilers of a capacity as large as those used for chemical wood pulp are utilized.

Following the boiling, the black liquor is run off and the remaining esparto washed until the soda is eliminated. From there it is conveyed to the breaking engine where a further washing takes place, afterwards being subjected to bleaching through the agency of an active chlorine compound. Finally, the grass reaches the beating stage and it is a peculiar feature of this fiber that it is not considerably affected by this operation. The bulk, length and flexibility of the fiber is retained, but the time devoted to beating governs the resultant papers and allows for the production of either bulky, lightweight papers or a close, smooth sheet. Subsequent processes are as in ordinary paper manufacture.

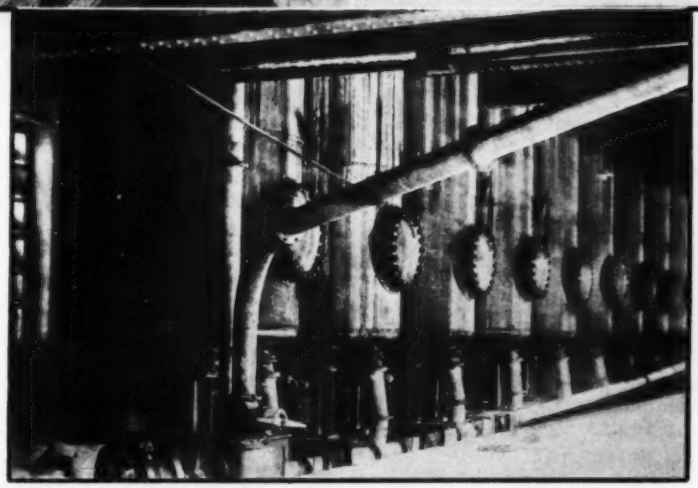
The yield of pure cellulose from the grass is under 50 per cent. Actually, the Spanish quality gives 45 per cent and the African as low as 38 per cent. A large supply therefore is carried by the mills, sometimes amounting to as much as 3,000 to 4,000 tons in the case of a mill with an output of 200 tons or more of esparto papers a week.

The esparto fiber closely resembles straw except that it possesses a greater degree of pliability and is softer. It varies from 1.2 to 1.5 mm. in length and is, therefore, shorter than wood fiber. It has a round, smooth, slightly curved appearance with a fairly thick wall and is uniform in width, the ends being gradually



Courtesy The Guard Bridge Paper Co., Ltd.

Above—Esparto storage plant



Above—Duster showing suction pipes for extracting dust

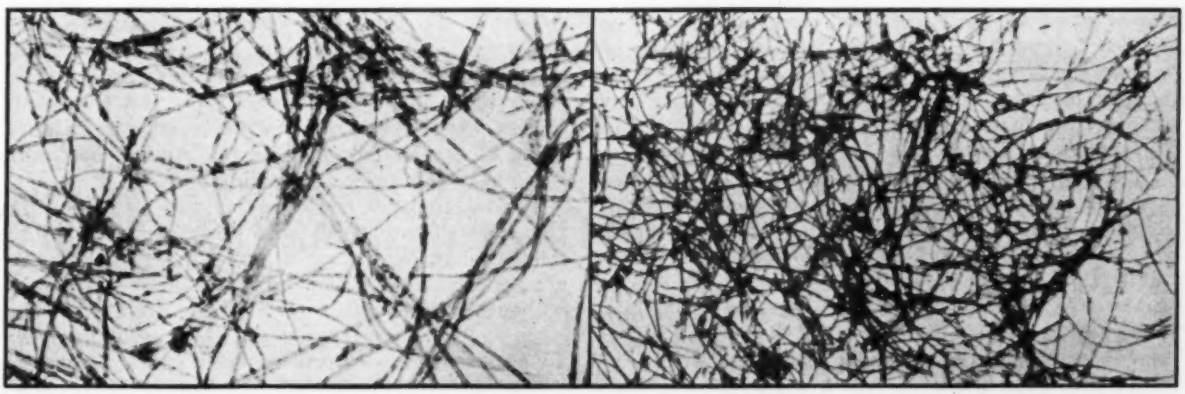
Right — Esparto digesters

drawn out to points which are rounded off. The shortness and thickness of the fibers allow for close packing and offer a high degree of opacity. At the same time, their stiffness acts against compression and provides the secret of its wonderful bulking powers.

Esparto fiber is seldom used alone, but it is commonly mixed with sulphite wood fibers. This combination adds strength to the paper and allows for the production of a brighter white sheet.

The continued popularity of the esparto grades is directly due to several important features which are encountered only in these papers. While they are slightly more expensive than sulphite wood grades, they offer many advantages in printing, particularly in the production of color work, which the printer readily appreciates.

Among its more important points is its very high bulking powers, actually 15 to 20 per cent greater than any other fiber. This characteristic of esparto fiber has resulted in the production of a class of papers known in Great Britain as featherweight antiques. These papers, laid or wove, are produced entirely of esparto grass. So high is the bulk of this grade that a sheet in the substance of 30 x 40 inches, 60 pounds



Spanish esparto before beating (left) and after beating (right)

Courtesy The Association of Makers of Esparto Papers

to the ream of 516 sheets, will provide a bulk of one inch to 320 pages. In recent years, even this bulk has been exceeded. Makers are now able to reach a bulk of 33/32nds. It can be realized how useful this bulk is in the production of cheap novels which convey a sense of excellent value for money. The sheet, naturally loosely woven, caused considerable anxiety to the printer in the early days through the paper fluffing and consequent frequent "washing up." Through careful study in manufacture, this trouble has been overcome and complaints regarding it are now seldom received. Naturally, such papers are suitable only for letterpress work. To allow for the introduction of line blocks and the growing fashion for wood cut illustrations, these featherweights are given a slight rolling which provides a closer surface, but, at the same time, reduces bulk by a minor degree.

Along with the bulky antique, there is also a class of hard antique, which is very popular, and an excellent range of offset and gravure papers. The needs of these particular printing processes have been the subject of intense study during the past few years by the esparto mills. This study, aided by carefully produced publicity, has resulted in many advertisers perceiving the possibilities of this new form of appeal and the demand for esparto papers has been little short of phenomenal. These papers are pliable; they possess a perfect white shade, a very slightly grained finish, and they are soft to slightly hard sized. Such features adapted to intaglio printing are readily receptive and produce a clear, delicate impression of considerable beauty and attractiveness which is further enhanced by a high degree of registration.

Incidentally, perfect registration is the most reliable feature of esparto papers, as esparto fiber stretches less than any other fiber. Consequently, for the production of lithographic papers, esparto fibers stand pre-eminent.

This non-stretchable propensity of esparto fibers also renders the resultant paper a particularly fine base for coating. Added to this characteristic, the extra bulk allows for a lighter weight paper being used, and, although more expensive, offers a saving against wood body grades by the use of a thinner paper.

Again, practically all British makes of imitation arts are composed of esparto fibers, the makers of which are now capable of offering a high white shade with a firm, smooth surface and evensidedness. In the hands of capable printers, these papers can produce excellent multi-colored printing with a screen as fine as 133. The softness of the fibers is also of advantage in this class of printing as it does not reduce the surface of the fine and intricate blocks so readily as do the wood papers which are so much harder.

Writing papers, too, are made extensively from this fiber. It is safe to say that in England such papers have a greater sale than the cheaper wood papers because of their smooth writing surface and general high quality which commends them.

Among other features peculiar to this fiber may be mentioned its affinity to loading and its power of retaining 32 per cent to 38 per cent of filler, only the best quality of china clay being ordinarily used for this purpose. With such a high percentage of retention, the interstices of the paper surface are well filled. Such papers, generally, are not affected quickly by changes in temperature and humidity, but are readily receptive to the impression of the papermaking machine wire. This fiber softness, however, offers the advantage of pliability and an excellence for folding work, a valuable asset in the case of boards.

Carbon Tetrachloride for Cleaning Wires and Felts

H. B. Richmond
Consolidated Water Power & Paper Company

FOR a great many years it has been a regular procedure to use kerosene and gasoline for the removal of spots from fourdrinier wires and felts. The spots which form on wires and felts are generally of a resinous, pitchy, or greasy nature, and as kerosene or gasoline is more or less of a solvent for pitch or grease it has been common practice to use one or the other of them to clean wires and felts of such spots.

The use of kerosene and more especially gasoline around a paper machine creates a fire hazard which is very objectionable and numerous fires have been caused by their use. There is also the danger when using these materials of leaving traces of oil in the sheet and a slight odor from such traces, while not objectionable in some papers, is very detrimental in high grade papers and those used in the wrapping of foodstuffs.

Carbon tetrachloride is much more efficient than either kerosene or gasoline for these cleaning purposes. It is a better solvent for resin, pitch or grease. Its use entails no fire hazard. It evaporates faster. It leaves no odor in the sheet, or trace of oil or grease. A much less quantity of it is necessary to do the same amount of work; and its cost is very little, if any more than either kerosene or gasoline due to the fact that less is needed. At the same time, by purchasing a commercial grade of carbon tetrachloride in drum or half-drum lots a very fair price can be obtained.

For taking spots out of either wire or felt on the run, a small squirt can of the pressure type with a small opening in the spout is recommended. The use of such a can allows the liquid to hit the spot with force without being nearly so wasteful as a plain can with a large spout. For removing spots when machine is down, a pair of small wire brushes come in very handy in helping to brush out the resinous material as the carbon tetrachloride dissolves it.

A Summary of the Research Work of the Experimental Paper Mill of the National Bureau of Standards

MERLE B. SHAW, Paper Technologist*
National Bureau of Standards

THE experimental paper mill of the National Bureau of Standards might well be likened to the test tubes of a chemist. Industry calls upon the chemist to find products that can be made from its raw materials and its refuse. New products and new outlets for products are the chemist's goal. The experimental paper mill is likewise called upon to find uses for new materials and new uses for old. As quality of product, marketing possibilities, and improved processes of manufacture are first seen in the chemist's test tubes, so are they in the test results of an experimental paper mill.

The work carried on in the paper mill of the Bureau of Standards consists of the study of materials and processes—the former for the purpose of determining their potential value for paper manufacture; the latter for the purpose of increasing the efficiency of the manufacturing processes in use and developing improved processes. It is usually not feasible to make such studies in commercial mills, as they would seriously affect production and as the processes cannot be controlled in such a way as to obtain sufficiently accurate data. Complete data on the various steps in the manufacturing process and definite results at the lowest cost can be obtained in an experimental mill.

The following is a description of the bureau paper mill and a summary of the work carried on there in recent years. For the information of readers desiring more detailed data on the researches mentioned, all publications relating to them are listed.

EQUIPMENT

The equipment of the bureau paper mill is adequate for practically all types of papermaking research, and is adapted for papermaking tests on either laboratory or semicommercial scale. It permits study of all the common papermaking processes: cooking, bleaching, washing, sizing, filling, beating, jordaning, papermachine treatment, calendering, surface sizing, and coating.

Laboratory

The laboratory equipment consists of a rotary boiler, small beaters, fiber-sheet mold, sheet press, and dryer.

The need in the papermaking research at the Bureau for a loboratory method of making small sheets of fibres suitable for evaluating the papermaking quality of pulp led to the development of a method for making hand sheets and the construction of a sheet machine[1]. In the investigation of new materials it is frequently desired to study the behavior of the fibres under paper-manufacturing conditions without making paper-machine runs, which are costly and require considerable quantities of the fibrous materials. A laboratory method analogous to paper-mill processes is of distinct advantage in such research. A number of methods have been proposed but as yet none has been adopted as standard by the paper industry.

The method described in the bureau publication[1] relates to the forming of the sheet on the mold and the subsequent operations of couching, pressing, and drying.

Measurement of the physical properties of the finished papers show whether the sheets are uniform in quality—formation, weight, etc. Comparison of the data for a series of sheets made from a given sample of stock show whether different sheets are in good agreement and whether the method permits duplication of sheets as desired. With the equipment and procedure described satisfactory sheets can be made by an operator of average skill. The personal equation is reduced to a minimum and truly comparable results are obtained by different operators.

The results obtained with the sheet machine warrant the view that the method is practical and is useful for mill control or papermaking research.

Semicommercial

The semicommercial equipment has been designed to be as flexible as possible in order that it might be adapted to the needs of the various problems. It is used for practical comparison, under carefully controlled conditions, of one material with another and of the effect of variations in the papermaking operations on a given material. The equipment consists of a rag duster; rag cutter; rotary boiler; 50-pound copper-lined wood-tub beater having manganese-bronze bars and plate and equipped with a washing cylinder; 300-pound tile-lined cement beater, having phosphor-bronze bars and plate and equipped with two washing cylinders; jordan refiner, equipped with bars of a bronze and steel alloy and driven by a variable-speed motor; 4-plate screen; 29-inch fourdrinier papermaking machine, with wire 33 feet long and having two presses, nine 15-inch dryers, a small machine stack of seven rolls, and a reel; surface-sizing bath; 14-inch Waldron, flat-bed, brush coater with festoon drier (enclosed in a cabinet equipped for air conditioning and temperature control); and a 5-roll supercalender.**

*Publication approved by the Director of the National Bureau of Standards of the U. S. Department of Commerce.

**Photographs of equipment are shown in BS Tech. Paper No. 340, Caroá Fiber as a Papermaking Material, pp. 338-341; also in Equipment and Research Work of the Bureau of Standards Paper Mill, *Paper Trade J.*, 89, No. 19, pp. 60-63; Nov. 7, 1929.

RESEARCH ACCOMPLISHMENTS

Fibrous Materials

The purpose of the work on fibrous materials is to obtain information on the practicability of substituting other plant fibers for the common papermaking materials, in view of the possibility of shortage of the latter; the possibility of obtaining new types of papers or new properties in papers from such materials; and the possibility of making profitable use of waste products of this kind.

The fibrous materials worked on for which reports have been rendered are: Seed flax straw[2], caroá fiber[3], cotton stalks[4], esparto[5], stipa ichu grass[6], manila rope waste[7], waste mail pouches[8], rayon[9], phormium tenax, or New Zealand flax[10], and cornstalks[11].

Seed flax straw[2]—The United States produces over a million tons of seed flax straw annually of which the greater part is waste material. Whole seed flax straw and a good quality of seed flax tow were used in the papermaking experiments. Although the whole flax straw had been thrashed previous to being baled, it was very chaffy and contained an appreciable amount of seed.

The tests, in which the sulphate pulping process was used, indicated that wrapping paper of fair quality can be made from whole seed flax straw; that writing paper of good quality can be made from seed flax tow, provided especial care is taken to eliminate specks; that pulp prepared from seed flax tow can be readily bleached; and that the chemical consumption in the preparation of pulp from the whole straw is about double that required for wood, but from a good quality of seed flax tow, only slightly in excess of that required for wood. At the present time, however, it is not feasible to use seed flax fiber for the making of paper of any description because of economic considerations, principally because seed flax straw cannot compete with wood pulp in cost.

Caroá fiber[3]—Caroá is a plant of the pineapple family indigenous to eastern Brazil. The leaf of the plant is about 4 feet long and from 1½ to 2 inches wide, being slightly larger than that of the pineapple, which in certain parts of the world, particularly the Philippine Islands, is extensively used for the manufacture of textiles. By beating the leaf between stones the natives separate the fiber, which after subsequent retting and washing is used locally for coarse handmade twines, nets, and rope. Caroá is not employed commercially, however, but production and cost estimates indicate that its use for papermaking would be practical.

In preparing the material for the papermaking tests the caustic soda process was used. With small amounts of caustic the paper produced was very strong and well-suited for bag or wrapping purposes. With larger amounts, the pulp bleached easily to a good white and the paper made compared favorably with papers made from rag stock. The chemical consumption and yield of pulp were satisfactory.

Cotton stalks[4]—Several million acres of cotton are harvested every year in the United States. The yield of stalks is estimated at 1000 pounds per acre. At present this enormous supply of raw material is largely a waste product. While it is quite well established that cotton stalks offer little possibility of general use as a fibrous raw material for papermaking, it was considered advisable, owing to constant inquiries concerning such use, to secure specific data relative to its value.

The cotton stalks used in the investigation were shredded before shipment. Pulping and papermaking tests were made on both laboratory and semicommercial scale. Preliminary bleaching tests demonstrated the unfitness of the material for bleached papers because of the excessive amount of bleach required and the character of the paper produced. The stalks contained material that failed to bleach and showed in the finished paper as small brown specks.

The cotton stalks were found to require severe chemical treatment and relatively long cooking for reduction to pulp. The yield of fiber was fairly good, being 35 to 40 per cent of the weight of the shredded stalks, but the paper produced was deficient in strength and of poor appearance, being suitable only for low-grade wrapping or board.

On the basis of cost of collection, yield of fiber obtained, and quality of paper produced, the test results indicated that making paper from cotton stalks by the usual papermaking methods is not commercially feasible.

Esparto[5]—Esparto is a perennial rush-like grass indigenous to southern Spain and the northern coast of Africa. Large crops are obtained from these regions without cultivation. The fiber is extensively employed in the manufacture of paper in European countries deficient in pulp wood. In general, it is used for book and other print papers and is therefore comparable to the soda sulp commonly employed in the United States.

Statements have been made that large quantities of esparto "semi-pulp" could be supplied to the paper mills of this country at no higher cost than soda wood pulp and that paper made from it possesses strength and printing qualities superior to those obtained with soda pulp. In view of its papermaking value, comparative papermaking tests were made at the bureau.

In order to obtain paper free from specks and shives, it was necessary to clean the "semi-pulp" before subjecting it to the digestion process. The subsequent yield of papermaking fiber, based on the weight of the material as received, was 57 to 63 per cent.

On the basis of quality of paper produced, the results indicate that the esparto "semi-pulp" of this investigation compared favorably with soda wood pulp as papermaking material. Cooks were made with varying amounts of caustic soda, but the best results were obtained when 5 per cent was employed. The paper from these cooks was appreciably stronger than that from soda pulp and approached paper made from sulphite pulp in strength.

Stipa ichu grass[6]—Stipa ichu grass is native to South America through the regions of the Andes southward to Argentina. In many parts of the Andes it is a dominant grass above the timber line. While the tests were made on laboratory scale only, the results indicate that this material offers little possibility as a source of paper fiber. The yield of pulp by the caustic soda process was only 25.5 per cent, and the bleaching quality was poor. The more severe cooking treatment required

for producing bleachable pulp would further decrease its yield. The fiber was short and not very strong, being similar in papermaking characteristics to soda pulp made from deciduous woods.

Manila rope waste[7]—The results of laboratory papermaking tests of waste fiber from the manufacture of manila rope indicate that this material may possibly be profitably employed for papermaking. The tests were made on samples submitted by the Navy Department from its Boston Navy Yard rope manufacturing plant. The waste fiber was very fine and bulky and contained 14 per cent of oils, derived from the oils used in the rope-making process. It was pulped, as received, with various alkaline chemicals. The best-appearing paper was obtained by the use of caustic soda. This process gave a pulp yield of 35 per cent. The paper was suitable for wrapping, comparing favorably with sulphite-manila wrapping in strength. Much better results could no doubt be obtained by extracting the oil before pulping.

Waste mail pouches[8]—One of the functions of the bureau is to act as a research laboratory for other Government departments. An investigation to determine the papermaking value of worn mail pouches which have been declared unserviceable for postal use was one of the studies of this kind.

The unavoidable treatment to which mail pouches are subjected in train and station use causes them to become very dirty. Because of this condition the market price for the refuse material has been relatively low although the cloth used in the manufacture of the pouches is a good grade of cotton duck.

The papermaking tests were made on semicommercial scale under practical mill conditions. Caustic soda and lime-soda ash were the digesting agents employed in the boiling process to free the cellulose fiber from the noncellulose impurities. Clean pulp was obtained from the waste pouches and the paper produced therefrom was stronger than that made from sulphite wood pulp, and compared favorably with many of the high-grade bond and rag writing papers on the market. This practical demonstration of the papermaking quality of the material has resulted in increased revenue to the Government.

Rayon[9]—Because rayon occurs frequently in the rags used for making high-grade papers, rag paper manufacturers are interested in the papermaking quality of this material. Samples representative of each of the four general processes of rayon manufacture—viscose, nitrocellulose, cuprammonium, and cellulose acetate—were included in the tests. The rayon samples were treated exactly as rags are in making fine papers. The test data indicate that rayon is not suitable for use as papermaking fiber, and that it may actually be detrimental to the quality of rag paper.

Phormium tenax, or New Zealand flax[10]—Phormium tenax is a plant of the lily family native to New Zealand, where it grows luxuriantly under a wide range of conditions. It is cultivated to only a limited extent, but reports state that if the demand warranted it could be produced on a large scale sufficient for commercial consideration for papermaking. Its principal use at present is for cordage, but it does not withstand well the alternations of wetness and dryness to which rope is frequently subjected, and therefore it has not competed very successfully with other cordage materials.

The most satisfactory digestion procedure depends somewhat upon mill conditions. In the work at the Bureau both the caustic soda process and two-stage cooks using sodium sulphite and caustic soda, respectively, gave very good results, on the basis of both quality of fiber produced and yield obtained. No special equipment is required for the caustic soda process, whereas when sodium sulphite is employed the boiler should be of an acid-resistant material.

The tests indicate that *phormium tenax* is a promising material for the manufacture of wrapping or writing papers, but that the fiber needs to be thoroughly cleaned mechanically before being submitted to the papermaking processes. The scutched material, that from which the greatest amount of non-fibrous tissue has been removed, showed the best possibilities.

Cornstalks[11]—A study was made to determine the practicability of utilizing this form of waste farm product as a raw material for paper. Special mechanical preparation of the stalks was found essential to successful pulping with chemicals, on account of structural peculiarities of this type of plant stem. The best results were obtained by using only the outside shell, or cortex, which had been separated from the remainder of the stalk and shredded by mechanical processes.

The cornstalk fibers were found to be too brittle for use in the manufacture of wrapping papers of the ordinary type, where strength is the prime requisite, and although white pulp of satisfactory quality for medium grades of writing papers was produced, the yields were very low. The results indicated that less than half as much paper can be made from a ton of cornstalks as from an equivalent weight of wood.

From a consideration of all of the costs involved in making paper from cornstalks as compared with wood, it appears that cornstalks can not compete successfully with wood unless profitable uses are developed for the by-products or parts of the stalk not used in paper.

Non-fibrous Materials

The purpose of the work at the Bureau on non-fibrous materials is to develop optimum practice in papermaking operations, to conserve papermaking materials, and to find their relative values. The materials that have been studied are: clay, asbestine, talc, calcium sulphate, and gypsum for paper fillers; rubber latex; glue and sweet potato starch for beater sizing; glue for surface sizing; and clay, glue, starch, and casein for coating.

Fillers[12, 13]—Fillers, as the term is used in the paper industry, are finely divided substances added to paper to fill up the spaces between the fibers composing the sheet in order to increase its opaqueness and to improve the printing quality of the surface. Clays have long been used as fillers but papermakers in general have favored those of foreign source, holding that American clays produce paper inferior to that obtained with foreign clays. In view of the great amount of clay used in the paper industry and the possibilities of developing the clay industry of the United States, this investigation[12] was made to ascertain the relative merits of American and foreign clays for use as paper fillers.

The amount of clay retained in the finished paper, the quality of the paper produced, and those properties of the clay that might affect the paper manufacturing

processes were studied. The results of the tests showed that the amount of clay retained in the finished paper and the quality of the paper in general was the same for both American and foreign clays. The color and grit tests favored the foreign clays very slightly but not sufficiently to justify the consideration of only these properties in selecting clays.

Later, a number of commercial paper fillers, including asbestine, talc, clay, crown filler, and gypsum, were studied to determine their comparative paper-making values.[13] Asbestine, talc, and clay were found to have similar papermaking properties. Crown filler and gypsum, being soluble in water, yielded somewhat different results from the other, insoluble fillers. Retention was considerably less for the soluble materials, and, in general, the differences noted in the characteristics of the papers were due chiefly to the difference in the amount of filler retained. The sizing process and the other papermaking operations were not adversely affected by any of the fillers employed.

Rubber latex[14], [15]—In 1922, the Bureau did some work on rubber latex in paper, but the results obtained were not favorable to its use. It was found that if conditions—water, agitation, pH, etc.—were not carefully controlled, coagulated rubber would give trouble on the paper machine; also, that during natural aging of the paper the rubber oxidized, after a few days being completely oxidized. No attempt was made to study the effects of reusing the paper-machine white water in furnishing the beater, or recooking paper containing latex. Although the bureau has done no work on this material since the tests mentioned, the use of stabilizers with rubber latex now permits it to be used successfully in paper in a number of ways.

Beater sizing[16], [17]—In addition to rosin size, glue, starch, and other materials are sometimes used as beater size. The Bureau has done some work on glue[16] and sweet potato starch[17] as beater sizing materials.

It has been claimed that by the use of glue, paper can be made water-resistant or sized as satisfactorily as with rosin, and that papers made from cheaper raw materials, including rather large proportions of mineral filler, are materially improved in strength and other desirable qualities. The manufacturing processes usually involve the use of aluminum compounds to jell the glue solution before its use.

In the bureau work it was found that jelling the glue before adding it to the beater offered no advantage over the use of glue solutions. The papers containing glue without rosin size were unsized (waterleaf). The papers differed little in strength qualities from similar unsized papers made without glue, although the papers containing glue did seem harder and firmer than those without.

When the papers contained both glue and rosin, the strength was frequently, and the degree of sizing was generally, improved as compared with similar papers sized with rosin alone. The chief influence of the glue on the various types of papers seemed to be to improve such intangible properties as firmness, hardness, rattle, and handling qualities. The improvements in strength, degree of sizing and the intangible qualities just noted were especially marked in book papers containing clay filler.

Corn and cassava starches, the latter an imported product, are widely used as beater sizing in book and catalog papers to improve printing quality. To determine the suitability of sweet potato starch, made from cull sweet potatoes, for such use a series of book papers were made in which sweet potato starch was used in comparison with representative commercial corn and cassava sizing starches. The results obtained with the sweet potato starch[17] were equal to the best results obtained with the other starches with respect to strength and opacity of the papers, and were superior with respect to retention of mineral filler and "closing the sheet," as indicated by air permeability. Starch from cull sweet potatoes is apparently a high-grade material for beater sizing and at least equal in quality to the best commercial starches commonly used for the purpose. Its use in the domestic paper industry would mean profitable utilization of at least a part of another farm waste and increased income for the farmer.

Surface sizing paper with glue[18]—Many high-grade papers are given a surface coating of glue to improve their writing quality and other physical properties. In general, the results of a study of the effect of surface sizing made at the Bureau[18] indicate that with any given paper the bursting strength increases with increased retention of the glue, that the folding endurance increases with increasing glue content to a certain point and then decreases, and that the resistance of glue-sized papers to water and to wet rubbing may be markedly increased by treatment with a glue hardening material, such as formaldehyde. Such treatment requires careful control, however, lest the folding endurance be adversely affected.

Printing tests by the wet intaglio process on the experimentally tub-sized papers indicated that uniform surface sizing is of primary importance for efficient printing, and that papers tub sized with glue prepared from buffalo hide cuttings do not differ noticeably from those tub sized with other high-grade commercial glues.

Mineral coating—In view of developments in paper-coating clays and adhesives the Bureau at times has been called upon to study these materials for coating papers. The first work in recent years was in connection with a research on glue conducted by a research associate placed at the Bureau by the National Association of Glue Manufacturers. During the progress of the work, three publications[19], [20], [21] were issued. The general findings reported were as follows:

The proportion of glue required in coating mixtures varies almost inversely with the grade of the glue chosen, and the amount of the better-grade glues required may be less than that of casein. Uniformity in glue for coating processes may be obtained by drawing specifications to meet local and product requirements.

The use of glue introduces no new difficulties in the preparation and application of coating mixtures containing either neutral minerals, such as clay and blanc fixe, or alkaline substances, such as satin white. The use of ordinary glue-bound coated paper offers no new difficulties to the printer and engraver, at least as regards printing processes other than those lithographic and possibly offset processes for which a high degree of water resistance is required. The water resistance of glue-bound coated papers[21] may be markedly improved

either by treating the freshly coated papers with formaldehyde or by adding formaldehyde directly to the coating mixtures. The indicator method, developed by Carson and now an official method of the Technical Association of the Pulp and Paper Industry, appears to offer a satisfactory means of comparing the water resistance of coated papers.

A further study of paper-coating minerals and adhesives[22] was later carried on at the Bureau for the purpose of effecting economies and promoting the use of domestic resources, which would become very important in the event of any disturbance limiting the supplies of foreign origin. Four different coating clays, two foreign and two domestic, were the minerals employed in the tests. The domestic clays were from the same mine but had received different refining treatment —one having been washed only; the other, chemically treated and washed. Three types of high-grade adhesives were used—casein, glue, and modified or chemically treated starches.

The tests showed that the present methods of refining American clay have improved its color, fineness, and suspension quality. The American clay that had been chemically treated and washed compared favorably with the foreign clays as paper-coating minerals.

When the experimental papers were substituted for regular stock being printed by the half-tone process, equally good printing results were obtained with the American and foreign clays and with the three different kinds of adhesives, although the starch-bound coatings possibly may have absorbed somewhat more ink.

Modified starch has a number of attractive qualities not possessed by the other adhesives. It is clean, does not have an unpleasant odor, and is comparatively cheap. The coatings for which starch was used had less water resistance than the casein-bound coatings, but since a high degree of water resistance is not required for a large majority of printing papers, such as book, magazine, and catalogue, it is believed that starch-bound coatings could be used for these very satisfactorily.

Why some caseins when used as a binder for clay cause foaming of the coating slip during its application to paper was the basis of a study[23] at the Bureau in collaboration with the Bureau of Dairy Industry, Department of Agriculture. The study to determine the cause of foaming and how it may be prevented was made with a view to increasing the volume and the value of domestic casein used in the United States and thereby improving the financial condition of the dairy industry in this country.

Samples of commercial caseins were purchased from three principal producing sections of the country—eastern, central, and western. The caseins were of the three most common types, classified according to the method of preparation as sulphuric acid, "self-sour" or lactic acid, and grain curd muriatic acid. Samples made by the Bureau of Dairy Industry by different methods from the same lot of milk were also included in order to eliminate the possible influence of different milk source in evaluating differences in method of manufacture.

Both poor and good caseins were found among the samples made by each of the commonly used methods. Some of the coatings were unsatisfactory because of foaming of the coating mixture during its application to the paper, but all were well bound to the body paper, and, except for those that foamed during the coating process, all were of good printing quality.

The study in the paper mill indicates that tendency to cause foam is a property existent in the dry casein when it is delivered to the user, and not attributable to the method of preparing the paper-coating mixture. It was practically impossible to prevent foaming in slips with some of the caseins, and it was practically impossible to cause foaming in slips with others. It apparently also is not justifiable to claim that one type of casein differs from the others in inherent foaming tendency; foaming or non-foaming caseins may be made by any of the three general methods. The blending of caseins that foamed with those that did not foam eliminated the foaming tendency. The cause of foaming, however, was not discovered in the investigation.

The laboratory study of causes and prevention of foaming was continued further by the Bureau of Dairy Industry, Department of Agriculture, to which bureau the reader is referred for later findings.

Papermaking Processes

Condenser paper[24]—Research was made in co-operation with the General Electric Company to develop a method of making a more satisfactory paper for use in electric power condensers. Such paper must be not over 0.0005 inch thick and must be practically free from pin holes and conducting particles. On the basis of the results obtained the following conclusions and recommendations were made: A high degree of cleanliness of the stock and the whole papermaking system is essential in order to make suitable paper. New cotton and linen cuttings, carefully cut and dusted, should be used raw in the beater. In cutting and dusting, a self-cleaning magnet roll to remove metal and conducting particles from the cut rags could be used to advantage. The beater should have a stone or cement and quartz roll and plate, and the sand trap or stock box should have a self-cleaning magnet roll to serve as a last precaution before the stock goes on the machine. If a fourdrinier machine is used the wire should not be coarser than No. 90, and a pick-up felt around the upper couch roll is desirable. If a cylinder machine is used care must be taken to obtain a well-formed sheet free from pin holes. A satisfactory condenser paper was produced in the experimental work and the recommended practice has since been adopted by a number of domestic mills with excellent results.

Roofing felts[25]—A study on roofing felts to determine the relative value of different fiber compositions in the life and serviceability of asphalt-saturated and coated roofing materials was made in co-operation with the Manufacturing and Industrial Research Committee of the Asphalt Shingle and Roofing Institute.

Paper felts composed of varying proportions of the usual felt-making fibrous materials and having a high content of low-grade substitutes were made in the experimental paper mill of the Bureau. The raw materials employed were roofing rags, old jute and manila bagging, old newspapers, and finely-ground wood sawdust. Newspapers and sawdust are not used commercially in roofing felts, but since considerable economy could be effected by their use if the life of the roofing

would not be impaired thereby, it was desired to study felts containing them. The felts produced were asphalt-saturated and coated, and thus converted into roofing, in a commercial roofing mill. As one of the felts contained as high as 60 per cent mixed wood-fiber papers and 30 per cent of sawdust, it appears that the use of such substitutes is promising and that large amounts of such substitutes can be introduced into the felts without great difficulty in the manufacturing processes.

If durability tests, which are now in progress, show that the presence of the substitutes does not decrease the life of the felts in service, the use of these materials would effect considerable economy in the production of roofing felts. The lower cost of the substitute materials, and the reduction in time and power required for them in the papermaking processes, would contribute materially to lessen manufacturing costs.

Currency paper[26], [27]—As the annual replacement of worn-out paper currency had become of such magnitude as to cause concern regarding cost of renewal of currency and as to threaten to necessitate extensive enlargement of the currency printing plant, this study was undertaken to improve the wearing quality of currency paper.

The experimental tests were made on semicommercial scale under practical mill conditions. The papermaking fiber was obtained from new linen and cotton rags.

To determine the value of caustic soda as compared with lime for effecting the chemical cleansing of the fiber, each was used as digesting agent in the boiling process. The tests showed that either can be employed satisfactorily in the production of paper of currency quality. The experimental papers made from pulp prepared by the caustic soda process were fully as strong as those made from lime-cooked stock and were somewhat softer, therefore better in printing quality. Because caustic soda is a strong alkali, control methods are more necessary in the preparation of the cooking liquor to avoid injury to the papermaking fiber.

The effect of variation in fiber composition was included in the study. Different proportions of cotton and linen were employed but the best results were obtained with a mixture of 75 per cent linen and 25 per cent cotton. Equal quantities of these fibers produced a strong sheet, however, well above the folding endurance specified for currency paper.

The greater strength of the experimental papers was attributed chiefly to the method of beating the pulp, which was the principal departure from commercial practice. The characteristic feature of the beating operation was the very gradual application of roll pressure. Slow lowering of the roll permitted the fibers to be well brushed out and frayed without excessive reduction in length, and therefore to be in the best condition for good intertwining in the finished sheet.

A type of paper having more than double the folding strength of the currency paper being supplied for Government use when the study was initiated was produced in the investigation. As a result of the tests the current specifications for currency paper require much greater strength than that previously specified, and paper meeting the requirements is being supplied without increased cost to the Government or to the manufacturing contractor.

Permanence of Papers

The stability of paper is of particular significance in the preservation of valuable records. Impermanent papers have been used for records of perpetual value from inability to foretell the probable life span of the paper. It was therefore considered desirable to study the manufacture of record papers in the Bureau paper mill under carefully controlled conditions in order to secure data on the many variables in manufacture which may influence markedly the permanence of paper and its ability to withstand continual handling. The plan of investigation adopted included papermaking studies of all the important types of commercial chemical wood fibers and rag fibers commonly used in the manufacture of record papers. The work thus far completed has been on papers made from purified wood fibers[29], two different sulphite pulps[30], and new and old cotton rags.[31]

Cellulose in the pure state is a very stable material but it is susceptible to deterioration by chemical changes when associated with certain impurities. The degree of stability of paper is dependent on the purity of the paper in respect to active chemical components, the presence of which may be due to insufficient purification of the fiber or to other deteriorative agents produced or left within the paper by the method of manufacture. Some of the possible factors influencing the aging properties which arise in the process of converting pulp into paper were studied, including effects of alum (acidity), rosin, and starch used in beater sizing; and glue, starch, alum, and formaldehyde used in surface sizing.

The influence of acidity in inducing chemical deterioration of paper is generally realized and measurements have long been made to detect acidity and to measure its amount. Indicator paper (litmus) was formerly commonly used to detect acidity and titration to determine its quantity. It is now generally recognized that the intensity of an acid, rather than its quantity, is the essential factor in its activity, and that the active constituent of all acids is the hydrogen ion. The intensity of an acid solution is, therefore, represented quantitatively in terms of its hydrogen ion concentration.

In the production of paper, hydrogen ion concentration is chiefly of importance in determining the quantity of alum required to produce the proper reaction of the papermaking stock during the beating process and at the time of delivery to the machine. Earlier work[28] at the Bureau showed that a considerable saving in alum would in many cases be effected by adjusting the acidity of the stock. Measurements made in the mill indicated that the optimum pH value for the stock at the machine is from 5.0 to 5.5. The use of sulphuric acid to produce the proper hydrogen ion concentration does not give satisfactory sizing in the paper. A certain amount of colloidal aluminum hydrate, supplied by alum, is required for effective sizing, but the amount is minimum at the optimum pH value. The quantity in excess of that required to produce this value apparently has no favorable effect on the sizing quality of the paper.

Purified wood fiber[29]—Purified wood fibers are wood fibers which have been refined to a high state of cellu-

losic purity. The results obtained by converting the fibers into paper under semicommercial mill conditions and subsequent testing of the papers indicate that there is a definite relation between the acidity of the rosin-sized papers and their stability. Other factors being alike, papers with the lowest rosin content had the best resistance to accelerated aging. In general, the addition of starch in the beater caused an increase in the strength of the paper and had no deleterious effect upon the stability of the finished paper. The stability of the papers toward accelerated aging was improved by surface sizing. This protective effect was somewhat more pronounced in the case of glue than in starch sizing.

Sulphite pulp[30]—Two kinds of bleached sulphite pulp were used in these experiments. One was of domestic and the other of foreign manufacture. Papers made from either type underwent marked changes in properties when subjected to the accelerated aging test, which at the Bureau consists in heating the paper in air at 100 deg. C. for 72 hours and then repeating the pertinent chemical and physical tests to determine the degree of deterioration induced by chemical reactions within the papers. The moderate stability of the best papers produced in the study as indicated by the accelerated aging test was commensurate with the medium degree of fiber purity.

While the papers were relatively unstable, careful adjustment of the acidity of the rosin-sized papers resulted in marked improvement in their stability without sacrifice of the degree of sizing. The correct adjustment of acidity appeared to be at pH 5. The amount of rosin used in engine sizing the sulphite papers did not seem to be an important consideration as far as the effect on their stability was concerned.

When the unsized or the rosin-sized papers were surface sized with glue or starch there was an improvement in tensile properties and a decrease in tearing strength in approximate proportion to the amount of size taken up by the basic paper. In general, no very marked increase in folding endurance resulted on surface sizing with either glue or starch.

Rag fiber[31]—High-grade bond papers were made from new and from old rags supplied by a commercial paper mill. The relations of the cellulosic purity of the particular grades of rags used and of the processing treatments employed to make them into paper, on the stability, as indicated by the heat test, and on the strength of the papers made, were found to be as follows:

The new rags had a higher degree of cellulosic purity and were stronger than the old rags. These differences were reflected in the papers made from the rags. The new-rag papers were very stable and very strong when properly made, while the old-rag papers were less stable and were weak.

With increasing amounts of rosin at pH 5, the folding endurance and tearing strength decreased somewhat when the papers were heated, and there was a decrease in alpha cellulose and increase in copper number. These changes were noticeable at about 1 per cent rosin content for the papers prepared from new rags and at a somewhat lower content for those made from old rags.

With increasing amounts of alum and resultant corresponding increase in acidity, as measured by pH, with constant rosin content of 2 per cent, the folding endurance and tearing strength decreased moderately when the papers were heated, and there was a decided decrease in alpha cellulose and increase in copper number. The changes in alpha cellulose and copper number accelerated at acidities below pH 5. Of papers of the same acidity, those having the lower content of rosin were the more stable. The effects of acidity resulting from the use of alum were similar for the two kinds of rags.

The increased strength imparted to the paper by surface sizing with glue or starch was largely lost in the heat test. In general, surface sizing did not materially affect the papers of high stability, although it seems to have served as a protective surface which retarded

(Concluded on page 326)

Bibliography

1—The preparation of fiber test sheets, *BS J. Research* 5, 105-114 (1930) RP190.

2—Seed flax straw as papermaking material, *Paper Trade J.*, Vol. 77, No. 5, pp. 43-49, August 2, 1923.

3—Caroá fiber as a papermaking material, *B. S. Tech. Paper*, No. 340 (Jan. 29, 1927).

4—Cotton stalks as papermaking material, *Paper Trade J.*, Vol. 81, No. 5, pp. 50-51, July 30, 1925.

5—Esparto as a papermaking material, *Paper Trade J.*, Vol. 81, No. 12, pp. 55-56, Sept. 17, 1925.

6—Stipa ichu grass as a papermaking material, *Paper Trade J.*, Vol. 83, No. 18, pp. 105-106, Oct. 28, 1926.

7—Manila rope waste for paper manufacture, *Paper Trade J.*, Vol. 84, No. 18, pp. 68-70, May 5, 1927.

8—Waste mail pouches as papermaking material, *Paper Trade J.*, Vol. 84, No. 19, pp. 45-46, May 12, 1927.

9—Rayon as a papermaking material, *BS J. Research* 4, 203-211 (1930) RP 143.

10—The papermaking properties of *phormium tenax* (New Zealand flax), *BS J. Research* 6, 411-420 (1931) RP 285.

11—Papermaking quality of cornstalks, *NBS Misc. Publ. M 147* (Feb. 18, 1935).

12—Comparison of American and foreign clays as paper fillers, *BS Tech. Paper* No. 262 (Aug. 20, 1924).

13—A comparative study of paper fillers, *BS Tech. Paper* No. 301 (Dec. 5, 1925).

14—Rubber latex in paper, *Paper Trade J.*, Vol. 75, No. 26, pp. 53-55, Dec. 28, 1922.

15—Aging of rubber latex paper, *The India Rubber World*, Vol. 68, No. 3, pp. 561-2, June 1, 1923.

16—Glue as a beater sizing, *Paper Trade J.*, Vol. 84, No. 3, pp. 38-43, Jan. 20, 1927.

17—Suitability of sweet potato starch for the beater sizing of paper, *NBS Misc. Publ.* M 150.

18—Surface sizing of paper with glue, *Paper Trade J.*, Vol. 83, No. 23, pp. 39-43, Dec. 2, 1926.

19—Consideration of glue-bound coated paper, *Paper Trade J.*, Vol. 82, No. 8, pp. 247-251, Feb. 25, 1926.

20—Use of glue in coated paper, *BS Tech. Paper* No. 323 (Aug. 18, 1926).

21—Water resistance of mineral coated papers, *Paper Trade J.*, Vol. 84, No. 8, pp. 146-155, Feb. 24, 1927.

22—Further study of paper-coating minerals and adhesives, *BS J. Research* 5, 1189-1203 (1930) RP254.

23—Commercial casein: Relationship between laboratory tests and coating quality, *Ind. Eng. Chem.*, Vol. 25, p. 904, August, 1933.

24—A study of the experimental manufacture of condenser paper, THE PAPER INDUSTRY, Vol. 5, No. 2, pp. 309-311, May, 1923.

25—Experimental production of roofing felts, *BS J. Research* 2, 1001-1016 (1929) RP 67.

26—Research on the production of currency paper in the Bureau of Standards experimental paper mill, *BS Tech. Paper* No. 329 (Oct. 20, 1926).

27—Further experimental production of currency paper in the Bureau of Standards paper mill, *BS J. Research* 3, 899-926 (1929) RP 121.

28—Hydrogen ion concentration as a means for controlling acidity in papermaking processes, *Paper Trade J.*, Vol. 81, No. 10, pp. 59-62, Sept. 3, 1925.

29—Highly purified wood fibers as papermaking material, *BS J. Research* 7, 765-782 (1931) RP 372.

30—A study of some factors influencing the strength and stability of experimental papers made from two different sulphite pulps, *BS J. Research* 11, 7-23 (1933) RP 574.

31—A study of the relation of some properties of cotton rags to the strength and stability of experimental papers made from them, *NBS J. Research* 14, 649-665 (1935) RP 794.

Bureau papers can be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C. A limited number of reprints of articles published in trade journals are received by the Bureau and copies will be furnished by the Paper Section as long as the supply lasts.—*Author's Note.*

(Continued from page 325)

chemical deterioration of the less stable papers.

The study shows that careful processing of raw materials and purity of fiber in respect to active chemical components are necessary for the manufacture of stable papers. Resistance of paper to deterioration from internal causes, however, is not sufficient to insure its stability. The conditions of its use and storage are as important as the initial quality of the paper. For discussion of external deteriorative agencies—light, temperature, humidity, acidic pollution of air—and recommendations as to storage conditions for prolonging the life of paper, the reader is referred to a previous Bureau publication.†

†Summary report of Bureau of Standards research on preservation of records, BS Misc. Publ. M144 (1934).

Not only the Government but also the paper industry and the consumer have benefited by the research work of the Paper Section of the National Bureau of Standards. The technical information made available for purchase specifications has resulted in improved quality of paper without increased cost to the Government, which has been reflected in the quality of similar commercial papers, also. The practical demonstrations of the papermaking quality and possible utilization of waste materials have resulted in increased revenue to the Government and in potential increased income for the farmer and the producer. Manufacturing practices recommended as a consequence of the experimental work have been adopted by commercial mills with excellent results, both as to improved quality of product and lessened manufacturing costs.

Proper Motoring Pays*

H. M. FRENCH
Industrial Engineering Department, General Electric Company

EVERY industrial plant manager is interested in reducing operating costs. Proper motoring is one good way to do it. Better use of equipment, enclosed instead of open motors, maintenance of high power factor, and synchronous instead of induction motors—these are all ways to attack the problem.

Many machines have been equipped with motors larger than required for their heaviest probable job, "just to be safe." The owner paid an efficiency and power factor tax year after year. Bad effects of overmotoring are emphasized by a survey in one plant where power lines overheated. Investigation showed a plant power factor of approximately 0.70. Motor loads were studied in an attempt to avoid buying new cables. A motor load survey made with meters showed a majority underloaded (some only about 30 per cent loaded), while others were overloaded. Motor rearrangement saved the cost of new cable.

Enclosed motors chiefly reduce maintenance rather than power costs. In many plants, motors must operate in dust, dirt, moisture, corrosive gases, etc. Standard open motors in such locations involve high maintenance costs due to overheating caused by reduced ventilation, short circuits, burning or rapid wear of collector rings, commutators and brushes and to other difficulties. Motors are available with various types of partial and total enclosures, some of the latter with fan-cooling. Frame sizes, rating for rating, in many cases are identical with those of open motors. For larger ratings, slightly larger frame sizes are required to give the same output.

Induction-motor power factors vary widely according to load and speed, being higher for high-speed well-loaded motors. Hence, high-speed fully loaded motors are desirable wherever possible. Gear motors, which comprise, a high-speed motor and a reduction gear mounted as a unit, frequently can be used to advantage. Therefore, when a power-factor survey is made, induction motor speeds and loads should be checked. After induction motors have been arranged to best advantage, further improvements in power factor must be obtained by using capacitors, synchronous condensers, or synchronous motors.

Substitution of synchronous for induction motors, in addition to correcting power factor, improves efficiency, particularly at part loads, and gives constant-speed operation. Efficiencies of synchronous motors are from 1 to 3 points higher than those of corresponding induction motors. With a difference of, say, 2 per cent in a 220-hp. motor, the synchronous motor on a basis of 4,000-hr. per-yr. operation and power at $0.02 per kw.-hr. shows a saving of $800 per year. This amount capitalized at 10 per cent would justify an increased expenditure of $8,000.

A California paper-mill's modernization investment is paying a 27 per cent annual return. This plant manufactures tissue paper for fruit wrappers. Before modernization, it was operated by induction motors, power factor ranging between 0.44 for light and 0.80 for heavy load conditions. After tests, it was estimated that by substituting synchronous for induction motors on five Jordans and four beaters a possible saving could be made of $3,500 per yr. This amount represented 25.7 per cent on total investment including installation costs.

Three new synchronous motors were purchased, together with new rotors and necessary parts to change the four beater motors to synchronous units. Additional control equipment was also required. In order that the plant officials might calculate accurately the return on their investment, a wattmeter, power-factor meter and a demand meter formed a part of the order. As a result of this modernization, plant power factor now averages 99.8 per cent and the annual saving is $3,800 per yr., a return of 27 per cent on the investment. Of this, $2,600 is due to improved power factor and $1,200 because of better efficiency.

(*) An excerpt of article published in the June, 1935 issue of *Power*.

Finishing Room Problems

J. G. WEINER,
Standard Paper Manufacturing Company (Mill 3)

THE finishing room too long has remained the silent partner in this great game of papermaking. It has been treated as an orphan or a stepchild. In any discussion which arises in papermaking problems, printer's problems, etc., two focal points, the beater room and the machine room, are discussed endlessly. However, the finishing and packing department has a very definite place and is more deserving of attention and consideration than has been given it heretofore. It is the final stepping point from the mill to the consumer. All the good done by the machines and beaters may be undone by the finishing department due to faulty and sloppy finishing and packing.

Certainly, there is a splendid opportunity for the boss finisher to save his salary over and over again in the elimination of excess and unnecessary waste and broke by the efficient co-ordination of facilities and with the co-operation of his management.

Knowing that every finishing and packing department presents its own peculiar and individual problems, it is not the purpose of the author to offer a panacea for any and all problems, but rather to relate of personal findings and experiences as boss finisher of a book, bond, writing, offset and specialty mill producing from forty to fifty tons daily, about 96 per cent of which is sheeted and packed with little hand sorting.

In the finishing department, the personnel problem is different from the rest of the mill, because the largest percentage of the work is manual and not mechanical. The personnel plays a great part in making the job of boss finisher a success or a failure. There must be absolute co-operation on the part of the help, and even before that, there must be the willingness to co-operate. As in any other problem of personnel handling, regardless of the trade, the men must be taught the value of carrying out given instructions. It might be added that all orders should be in writing with copies kept on file. Also, as in other trades, the minimum of labor turnover makes for a more efficient organization.

The finishing operation begins after the paper leaves the machine in rolls, except, of course, where the paper is sheeted immediately behind the machine. Except where the rolls are to be rewound, the rolls go to a rotary cutter. Modern production methods require a cutter capable of high speeds and with a layboy to catch the paper. The author has found it unsatisfactory to count on the cutter because the grades of paper finished in his particular mill demand closer inspection which mechanical counting would not give.

Log rolls reduce cutting time considerably, but tend to make for more waste at the cutter. It is a question often debated as to which is preferable—several large layboy cutters or a battery of small layboy cutters. This question can be answered best by a survey of the individual finishing room capacity and conditions.

It has been found on the cutters that better results can be obtained with log rolls by using frictions on both sides of the back stands instead of only one side. This has been a minor factor in the problem of waste elimination. The broke on the cutters will run from 4 to 6 per cent depending on the character of the rolls to be cut, the nature of the paper, and the size of the sheet. Experience has shown that on high grade print papers, the total waste in the finishing room will average 10 per cent to 13 per cent to convert machine rolls into salable paper.

Coming back to the rotary cutter, there is always a certain number of sheets that must be thrown away off the top of the rolls. Experience proves that is far better to run these over the cutter rather than to tear them off behind the cutter. Advantage may be taken of these bad sheets to properly set the layboy, adjust the knife, change gears, etc. before good paper starts coming over. Of course, in the case of a broken or torn roll or gashes, it is necessary to tear off the bad place behind the cutter. Sometimes where the paper is broken or torn on one side it is best to run the sheet over to save the good side, but this is a matter to be determined by the boss finisher or the cutter foreman. Too often the cutter man is overanxious to get production and loses sight of the value of the paper itself. It cannot be emphasized too strongly that five hundred sheets of paper saved is the equivalent of a days work on the part of the operator.

It will often happen that the catcher on the cutter will throw out a whole cut or series of cuts of eight or so sheets rather than stop the machine to throw out the bad sheet. The cutter should be stopped as often as necessary to throw out only the wrinkled or torn sheets, etc., saving the good paper. The cutter man will frequently start his machine too soon, not allowing the helper sufficient time to sort out the bad paper. This practice has been a constant source of complaint due to the catcher failing to get out all of the bad paper, and in the case of the cheaper grades, which are not hand sorted, these defects may escape the attention of the subsequent finishers.

When the rolls are run down on the cutter to approximately eight inches in diameter or less, it is necessary to lighten up on the friction to prevent short sheets due to excessive friction. It is very important that the sheets coming off the cutter be cut square. It is practically impossible to trim square a sheet which has been cut out of square to any sizable degree.

The condition of the rolls coming off the machine to the cutters have a great bearing on the percentage of waste at the cutters. Well wound, good hard rolls with a minimum of soft spots will decrease the percentage of broke materially.

It frequently happens that the cutter operator, through no fault of his own, is unable to run a loaded cutter without causing cutter wrinkles. This is often true on poorly wound papers, particularly

mimeograph and English finish book. It is far better to cut his production by running part of the rolls at a time, as the quality of paper produced would more than make up for the loss in operating time.

After the paper leaves the rotary cutter, it is hand counted and all four sides are fanned to detect and sort out all bad paper which has escaped the eyes of the cutterman or their helpers. More bad paper is eliminated and the work of the trimmer is expedited if the paper is kept counted before it reaches the guillotine trimmer. However, there are times when this is not practical. The author has been able to do this only in a limited way.

Based on experience and observation, it is the author's belief that the trimmer men are the first lieutenants in the finishing or packing department. The trimmer is the last stopping place where the paper is handled sufficiently to eliminate as far as possible any defects which have slipped by the cutter operator and cutter girl or helper. After the paper is trimmed four sides, the trimmerman can often detect wrinkled sheets by a close examination of the trimmed sides.

Regarding changing knives on the trimmers, there can be no set rule as to when and how often knives should be ground. The probable life of a set of trimmer knives should be nine months to a year.

The character of the paper trimmed is the controlling factor in determining the necessity for grinding. A knife on the trimmer might run two to four days on a sulphite bond, whereas it would probably last only three to four hours on a soft or heavily loaded paper. Both of these are extremes but have actually happened in practice.

The pressure on the trimmers should be regulated up or down as often as necessary to the grade of paper to be trimmed. Too often the trimmerman will continue to bring pressure up for soft papers and fail to decrease pressure proportionately when changing to hard sized high finish papers, thereby using unnecessary pressure and unduly wearing out the pressure leathers. This often causes renewal of the leathers due to lack of efficiency on the part of the trimmerman.

The trimmerman should inspect carefully a reground knife before placing it in the machine, particularly watching out for blackening caused by excessive pressure at the grinding wheel. Knives blackened or burnt by inexperienced or incapable grindermen often require three to six grindings before they are restored to their true temper where a good cutting edge can be held for any length of time. Knives so treated do not last as long as those that have proper care.

The bevel on a trimmer knife has always been a source of discussion. It has been found that a $1\frac{3}{16}$ to $1\frac{1}{4}$ inch bevel will take care of most of the ordinary grades of paper.

The boss finisher should check the sheets himself as to size and squareness or delegate someone to do this important rechecking. Frequent turning of the sticks is beneficial in prolonging the life of the trimmer knife. The cost of these is small compared to the cost of grinding the knife.

An additional feature that has been worked out and found successful on trimmers is to place a magnifying glass in front of the trimmer gauge thereby enlarging the fractional divisions. This has proved a very valuable aid in accurately cutting exacting orders. It consists of an ordinary three-inch magnifying glass suspended in a frame with a twenty-five watt bulb over it. It also eliminates eyestrain on the part of the operator.

The trade has frequently objected to receiving papers which are kinked or broken. This is due largely to the trimmerman handling the paper alone, bending the two corners and breaking the paper across the table of the trimmer forming a "V." This could be avoided if the trimmerman would roll or fold both sides. However, the best way to eliminate kinks is to provide the trimmerman with a helper to handle the paper on and off the trimmer.

Cases, cartons, bundles and skids are the three general methods of packing paper.

In casing paper, the cases should be made of well seasoned lumber and should be well lined with waterproofed paper to insure the product reaching its destination in as near its original condition as is humanly possible. There is always the danger of nails being driven into the paper by inexperienced case men or because of grainy wood.

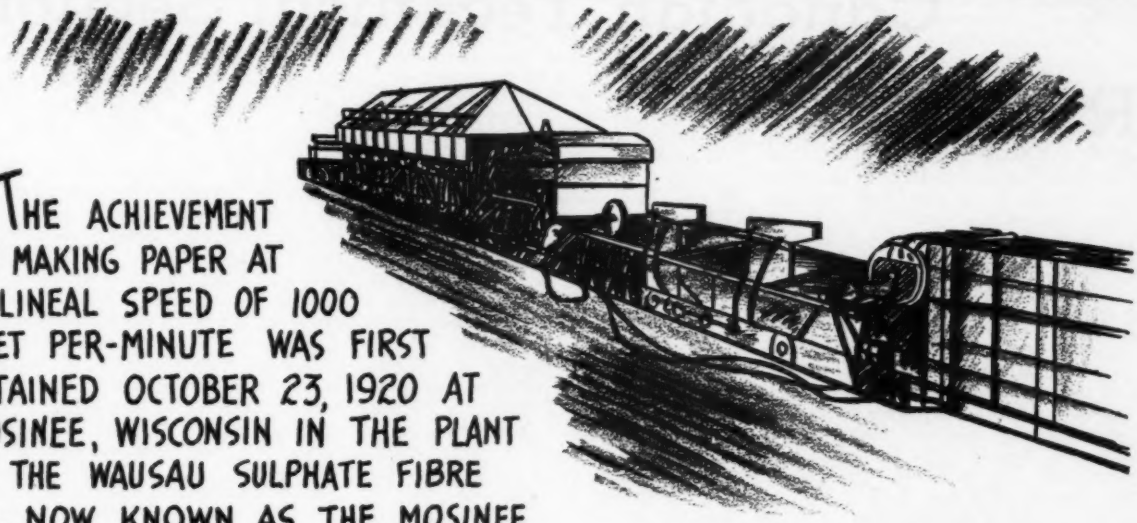
Skid packing is probably the ideal packing and is becoming increasingly popular. It is the least expensive to put up. The runners should be of ample strength and the corners of the skid should be protected with wooden boards. There are various methods on the market of binding the skids. Any of these methods are satisfactory provided sufficient tension is made possible to draw the paper down tight and evenly on all four sides.

Carton packing is comparatively new and has come into its own only in recent years. The telescoping type carton is generally used to allow for difference in substance weights and calipers. Cartons may be sealed around the edges with heavy four to eight inch sealing tape, or they may be rope tied or strapped. Each of these methods has advantages and disadvantages and there always will be differences of opinion on this subject. A carton which is sealed looks neater than a tied package, but in the case of small sizes contained in the carton, there is not sufficient binding power to stop the paper from "crawling" in the carton. In the case of tied or strapped cartons, the paper is bound. However, this very advantage acts as a disadvantage since the binding of the paper also is a source of trouble to the printer because the paper is buckled at each binding point. The same condition is present in the bundling of paper except where the chipboard tops and bottoms and corner pieces are of sufficient thickness and strength to prevent the rope or strapping from cutting through.

Where the paper is sealed before being placed in the carton and/or where the paper is the full size of the carton, sealing the carton is believed to be better, but it is the slowest operation of the three, if the carton is completely sealed all around as it should be. By using a carton that would fit double size as well as single size, it is possible to cut down on the number of sizes of cartons to be stocked. For example, a carton size 24 x 38 can also accomodate size 19 x 24.

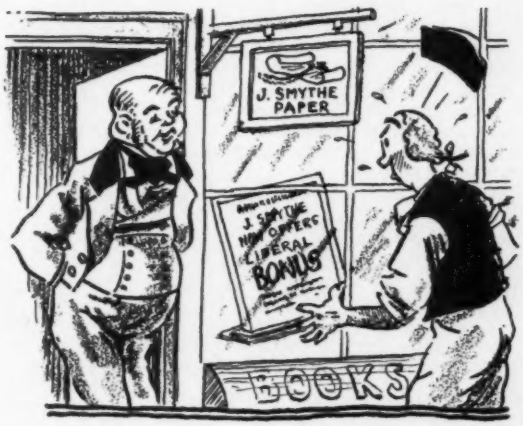
There is much more to be written on the subject of finishing room problems and practices. Nevertheless, it is hoped that this article will serve to stimulate some additional interest in the finishing room.

Paper Sketches ---



THE ACHIEVEMENT OF MAKING PAPER AT A LINEAL SPEED OF 1000 FEET PER-MINUTE WAS FIRST ATTAINED OCTOBER 23, 1920 AT MOSINEE, WISCONSIN IN THE PLANT OF THE WAUSAU SULPHATE FIBRE CO., NOW KNOWN AS THE MOSINEE PAPER MILLS CO.

NEW YORK, MICHIGAN, MAINE, OHIO, WISCONSIN AND PENNSYLVANIA, IN THE ORDER GIVEN, WERE THE SIX LARGEST PAPER-PRODUCING STATES DURING 1934.



TO INDUCE PEOPLE TO PART WITH LINEN AND COTTON RAGS IN QUANTITIES SUFFICIENT TO CARRY ON BUSINESS, COLONIAL PAPERMAKERS FOUND IT NECESSARY TO OFFER TEMPTING BONUSES OVER AND ABOVE ADVERTISED PRICES.

ABOUT THE REIGN OF AUGUSTUS CAESAR, A ROMAN SCHOOLMASTER-Q. REMMIUS FANNIUS PALAEMON- PERFECTED A PROCESS, NOW UNKNOWN, BY WHICH HE REDUCED THIRD GRADE PAPYRUS TO THE THINNESS OF FIRST QUALITY PAPYRUS.

Summer Meeting of Canadian Technical Section

REPRESENTATIVES of nearly every paper or pulp mill in Eastern Canada, as well as a number of visitors from the United States, attended the summer meeting of the Technical Section of the Canadian Pulp and Paper Association held in Ottawa on July 8, 9 and 10. The technical sessions consisted in the main of two symposia: one on the disposal of bark; the other, a joint discussion with the Woodlands Section on the handling of wood. This arrangement made it possible for each subject to be covered in sufficient detail and the program was so arranged that papers in each symposium were presented by local men and related to conditions at near-by mills which had been visited by the members. Parliament had prorogued a few days before the meeting and a general election is in the offing. Accordingly, it is not surprising that economic, if not political, topics received a good deal of attention at the non-technical sessions and in informal discussions. The highly satisfactory program of entertainment was due largely to the efforts of the newly-formed Ottawa Valley branch of the Technical Section.

Activities commenced on the morning of the 8th. with an inspection of the Gatineau mill of the Canadian International Paper Company, where four of the largest news machines in Canada are in operation. Equipment for bark burning at this mill attracted particular attention in view of the discussion on refuse disposal scheduled for the afternoon.

Luncheon

At the Technical Section luncheon, presided over by W. S. Kidd, chairman of the section, the Hon. Thomas G. Murphy, Minister of the Interior, spoke informally on the work of the Forestry Branch of his department. The branch maintains three forest products laboratories, that at Montreal being devoted exclusively to pulp and paper research, and a number of forest experiment stations so situated as to include in their limits woodland representative of the different types of forest from coast to coast. One problem of the branch is to complete a survey of the present forest resources of the Dominion and to determine the rates of growth of different species in different localities. Eventually, it will be possible to estimate fairly closely the annual increment, and hence the production on a sustained yield basis. In conclusion, the Minister paid a tribute to the technical men in the industry who, by continual improvement of manufacturing processes, have made pulp and paper products more accessible and hence have made real contributions to the lives of their fellow men.

Several interesting announcements were made at the luncheon. The Weldon medal, awarded annually for the best practical paper read at the January meeting of the section, was presented to Dr. W. Boyd Campbell for his paper "Fibre Structure and its Influence in Papermaking." The presentation was made by George Carruthers, who spoke feelingly of his long association with the late Mr. Weldon in whose memory the medal is given. Dr. Campbell in his reply expressed appreciation of the honor and said he regarded it as a tribute not so much to his own work as to that of the Forest Products Laboratories. He welcomed this recognition of fundamental research as being of ultimate practical value to the industry. The publishers of *Pulp and Paper of Canada*, through A. S. Christie, presented a balopticon with auxiliary lenses for the projection of microscope slides to the research institute at Montreal. It is expected that this instrument will be very useful at future meetings of the section. A. E. Fair, of the T.A.P.P.I. executive, extended greetings to the section on behalf of Clarke Heritage and voiced the hope that the friendly co-operation between the two societies would continue. R. G. Macdonald invited members of the Technical Section to attend the forthcoming T.A.P.P.I. meeting at Atlantic City.

It was announced that W. Gordon Mitchell had been appointed Technical Adviser to the Joint Administrative Committee of the Research Institute. Mr. Mitchell's duties will be to maintain contact between the workers at the Institute and committees of the Technical Section, and, in general, to help direct the work of the Institute along the most valuable lines. Mr. Mitchell, on being introduced to the meeting, made a plea for continuing support of co-operative research on the fundamental problems of the pulp and paper industry.

Cost Accounting

The first formal paper of the session, entitled *Cost Accounting and the Technical Man*, was delivered by R. P. Egerton. Mr. Egerton stated that, although standard methods of costing had been worked out for newsprint operation, costing in specialty mills presented more intricate problems. The speaker stressed the importance of proper accounting as a basis for valuing technical advances and urged the formation of a cost section of the association. He went on to describe the accounting system in use at the E. B. Eddy mill, illustrating his remarks by specimens of the numerous data sheets employed.

Symposium on Refuse Disposal

The remainder of the afternoon was devoted to a symposium on refuse disposal arranged by the Heat and Power Committee of the Section under the chairmanship of E. J. Calnan. K. S. LeBaron led off with a general discussion under the heading *What Shall We Do With the Bark?* It was pointed out that in many wood-using industries considerable quantities of fairly dry sawdust and other waste are available and can be burned with a high degree of efficiency to replace more expensive fuel. From the point of view of the pulp mill it is more often a question of disposing of material which cannot be dumped into the rivers. On account of the high moisture content of bark—the principal waste—its fuel value is comparatively low and may not amortise the cost of the installation required for burning it. Determination of the saving to be expected or of the cost to be incurred in the burning of bark is a special problem in each mill, and comparatively slight changes in operating conditions may make all the difference between profit and loss. The speaker dealt with the factors involved in considerable detail. The first of these is the quantity of bark available. At the Three Rivers mill of the Canadian International Paper Company it was estimated that for 100 per cent bark coverage there would be 254 pounds of bark per unit of barked wood. Actually bark coverage is never 100 per cent and varies with the length of the drive and the time of storage in the pond before the wood is sent to the slashers. Neither bark thickness nor coverage can be estimated accurately or easily; the determination of the weight of bark at 100 per cent coverage was based on measurements of thickness on more than three thousand logs and was checked by reference to bark tables prepared by the Forestry Branch of the Department of the Interior. Estimation of the variation of coverage during the slashing season involved observation of more than seventy thousand logs. Other factors requiring quantitative evaluation are the moisture content and fuel value of the bark and the amounts of other waste such as slasher sawdust, chipper sawdust, bull screen tailings, etc., that may be available. Moisture content is particularly important. It was calculated that reduction of the moisture content from 80 per cent to 60 per cent on the wet basis reduces the heat loss per pound of dry substance due to evaporation by 63 per cent. Bark presses for dewatering are essential if auxiliary fuel is not to be used to burn the bark. Two types of press were described.

Passing to the design of furnaces and boiler settings, Mr. LeBaron drew attention to the lack of satisfactory data on rates of burning per square foot of

grate area. Estimates are hard to make if the fuel is built up in conical piles in Dutch ovens since air passes through only the fringes of the pile. Sloping grates are probably preferable to flat grates in that a fuel bed of more uniform thickness can be maintained. If the grates were sloped away from the boiler a further advantage might be gained by causing the hot gases to pass over the incoming wet bark and dry it. Another desirable feature in Dutch oven construction is the provision of a suitable drop-nose arch and bridge wall so that the fuel is not cooled by direct radiation to the boiler tubes. A high boiler setting with ample space in the furnace proper is necessary for the complete combustion of the gases passing over from the Dutch oven. For waste at 55 per cent to 60 per cent moisture content the total furnace and Dutch oven volume might be calculated to give a liberation of about 25,000 B. T. U. per cubic foot per hour.

The efficiency of heat recovery is greatly increased by any method of utilizing the heat of the flue gas. Several methods have been proposed for predrying the waste by direct contact with flue gas, and air pre-heaters also have been included in bark furnace design. Actual installations involving these features were described in other papers of the symposium.

An account of methods of bark disposal at the Mersey Paper Company, prepared by J. H. M. Jones, was read by the chairman in the unavoidable absence of the author. Among the features of special interest at this mill is the bark conveying system. Bark from the drum barkers is sluiced to a sump and pumped by a trash pump either to bark storage ground or to an inclined save-all. The drained bark drops to a bark press followed by a hog. Hogged bark and other waste is blown to a cyclone in the boiler house. Excess air from a pre-heater reduces the moisture content to a certain extent in a dryer of special design. The waste is then fired in a Dutch oven connected to a boiler burning pulverized coal. Radiant heat from the furnace proper and from an auxiliary coal burner in the Dutch oven facilitate combustion of the bark. Advantages claimed for this system are as follows: a minimum of additional labor is required, steam from the Dutch oven boiler is generated at high pressure, and the conveying system is compact inexpensive and requires little maintenance.

F. L. Allen next described refuse disposal at the Dalhousie mill of the New Brunswick International Paper Company. Here the bark coverage is high and the quantity to be disposed of correspondingly great. The installation includes bark presses of the roll type and rotary louvre dryers in which flue gases are passed over the bark. The speaker gave complete tabular data on the performance of the dryers and stated that the moisture content was reduced to 54.5 per cent on the average. Combustion takes place in a Dutch oven shielded from the boiler tubes by a drop-nose arch. Using 54 per cent excess air a burning rate of 45 pounds per square foot of grate area per hour is realized, and it is expected that a considerably higher rate of disposal can be achieved by increasing the induced draft.

Refuse disposal at the Gatineau mill, which had been visited by the section, was described by W. T. Bennett. Here the disposal plant is a separate unit located near the slasher mill. The bark is not dried but is reduced to a moisture content of 70 per cent by bark presses. Inclusion of sawdust and other refuse somewhat reduces the average moisture content of the fuel going to the furnaces but some coal has to be fired with it to maintain combustion. Pre-heated air is supplied to the furnaces and the air-ducts and fans are so arranged that operation is very flexible, forced draft being applied below the grates or directed on all sides of the piles of refuse as conditions require.

A lively discussion, in which John Stadler took a prominent part, followed the symposium. In this the economics of bark burning, rather than details of installation, received the greatest attention. The main problem was presented as being one of point of view: should bark be regarded as a nuisance to be gotten rid of or as a potentially valuable source of power? While it was realized that accurate prediction of costs was not possible until further studies had been made along the lines indicated by Mr. LeBaron, the feeling of the meeting appeared to be that it was uneconomical to raise steam from bark in small installations, and that if the bark cannot be thrown away it would be better to burn it and let the heat go. Even where large quantities of bark are available, the cost of presses, dryers and a subsidiary steam plant may be hard to justify, particularly if the plant is to be operated only during a short slashing season. Mr. Stadler voiced the opinion in which others concurred, that the use of supplementary fuel to assist combustion of the bark was never economical.

On adjournment of the session a swimming party was held in the pool of the Chateau Laurier, and in view of the prevailing weather no more agreeable diversion could have been arranged. Refreshments and a highly informal entertainment were provided by the Ottawa Valley Branch of the Technical Section during the evening.

The Woodlands Section, which had been in session at the Petawawa Forest Experiment Station, joined the Technical Section on Tuesday, July 9. The morning was spent in visits to the mills of J. R. Booth, Limited, and of the E. B. Eddy Company Limited, where manufacture of boards, wrappings and tissues was inspected.

Joint Luncheon

At luncheon, the sections were honored by the presence of the Hon. Dr. R. J. Manion, Minister of Railways and Canals. Dr. Manion spoke forcefully on the economic problems of Canada and of the world. He criticized the "insane optimism" of private and public bodies which resulted in huge and unnecessary capital expenditures in the boom years and which in the case of governments led also to over-expansion of costly social services. Nevertheless these factors merely accentuated the depression which was due not to local but to world-wide causes—war debts and economic nationalism. Addressing the business men present, the minister pointed out that a great part of government expenditure at the present time, including as it does huge sums for interest on the war debt, is uncontrolable, and that it is therefore useless for them to urge balancing the budget until international trade improves. Passing to a more general treatment of economic and political matters, Dr. Manion declared that socialism and facism had failed and that the hope of recovery and liberty lay in capitalism under democracy. A vote of thanks to the speaker was moved by J. Stadler. Major General A. G. L. McNaughton, recently appointed president of the National Research Council, was introduced by W. S. Kidd. He spoke briefly on the aims of the organization and invited the members of both sections to visit the laboratories so as to familiarize themselves with the services which the research council could render to the industry. Greetings of the American Forestry Association were brought by F. D. Reid.

The Handling of Wood

During recent years there has been close co-operation between the Technical and the Woodlands sections, and several joint meetings have been arranged for the discussion of marginal problems of interest to both sections. This custom was continued at Ottawa, the afternoon session of July 9 being devoted to the subject of wood handling. A. Koroleff, chairman of the joint committee of the Technical and Woodlands sections, presided. The two formal papers of the afternoon were descriptive of wood preparation at the E. B. Eddy mill which had been visited during the morning. Howard Kennedy sketched the general lay-out of the conveyor systems and discussed the specifications of jack chains and conveyor cables. Mr. Kennedy drew particular attention to a type of reclaim conveyor developed by his company. This conveyor is low and is built up of light sections which can be moved easily by a peavy. As a result, the conveyor always can be kept close to the block pile and wood can be loaded at a very favorable labor cost.

Continuing, J. W. Patterson described the wood room operations at the same mill. The wood is barked in drum barkers which discharge to a rubber-faced conveyor belt. This type of conveyor permits easy inspection of the drummed wood and facilitates removal of blocks for further treatment by rossers, knife barker, knot borers or woodpecker, as may be required. There is also a return conveyor by which wood may be sent back to the drum barkers. Careful estimates were given of the

capacity of these various machines and of the wood lost in the different cleaning operations. The speaker had made a study of chipper performance and showed drawings of a square chipper spout of new design. Changes in the spout and bed knives had been found to necessitate changes in the setting of the knives. The operation of the modified chipper was in most respects highly satisfactory but further alterations to it were planned.

Although these two papers were in the main descriptive of particular installations, the authors were careful to bring up a number of general questions which were debated during the remainder of the afternoon. G. Belcher suggested that it should be possible to set some standard of cleanliness for wood intended for sulphite manufacture and that such a standard was highly desirable since excessive cleaning added greatly to wood costs. He also mentioned the usefulness of high-pressure showers in removing loose dirt. Although it is common practice to select the cleanest wood for the sulphite mill, C. Malcolm and others maintained that in news manufacture the cleanest wood should go to the groundwood mill since groundwood forms the larger proportion of the product. The question of sap peeling versus drum barking, which had been the subject of papers at the joint meeting of the previous year, was again to the fore. H. Kennedy considered sap peeling to be satisfactory if the wood was to be shipped by rail or truck, but pointed out that wood which is peeled and allowed to season before being river-driven picks up much dirt in seasoning cracks which is hard to remove. J. O. Wilson, woods manager of the Anglo-Canadian Pulp and Paper Company, spoke at some length on culling and cleaning in the woods, and urged woodlands men to study wood-room operations so as to have a clear understanding of what was required by the mills. On the other hand, he felt that certain government regulations limited the possible selection of wood and that increasing labor costs would soon make it uneconomical to do much cleaning by hand in the woods.

Two Sections Join for Dinner Meeting

A joint dinner of the two sections was held on the evening of July 9, at which W. A. Delahey, chairman of the Woodlands Section, presided. The guests at the head table were escorted to the banquet room by two pipers from the Cameron Highlanders. Controller Fulgence Charpentier welcomed the members to Ottawa on behalf of the mayor and spoke of the early development of the lumber industry in and around Ottawa. The speaker of the evening was Gratton O'Leary, editor of the *Ottawa Journal*, who took for his subject "Some Popular Fallacies." Mr. O'Leary dealt in witty and sometimes caustic phrases with slogans of the day which are certain to be repeated *ad nauseam* during the forthcoming election campaign. A searching analysis of the ideas inherent in the terms *rugged individualism*, *socialism*, *popular opinion* and *freedom of speech* showed how slight was the connection between these ideas and the loose thinking of many who used the terms. The speaker was interrupted by vigorous applause and a vote of thanks proposed by B. F. Avery was heartily supported. A program of song and music concluded the evening.

Last Day Occupied With Varied Interests

On the last day of the meeting some members divided their activities between visits to the operations of the Gatineau Boom Company and to the laboratories of the National Research Council, while others took part in the annual Golf tournament. The Technical Section trophy was won by J. Newell Stephenson, and the Fleck trophy, presented for competition between the Technical and Woodlands sections, was won by the former by a narrow margin.

◆ ◆

◆ Standards Ass'n Develops Dictionary of Drawings

Thirty national organizations and a number of independent experts have developed a graphical "dictionary" of drawings. The work has been adopted by the American Standards Association and will be used as the guide in thousands of drafting rooms throughout the country.

Heretofore, according to Dean Franklin DeR. Furman, Stevens Institute of Technology, who was chairman of the American Standards Association's committee, a lack of uniformity in symbols and other practice existed. As a result, drawings made by one company were not intelligible to other concerns which needed to use them.

"Most of the larger drafting rooms devised their own standard practices, and graphical symbols in unnecessary variety have been developed. Dean Furman states this new standard will help to eliminate this confusion.

Instructors in schools and colleges have been at a loss to know what practice to teach in their mechanical drawing and machine shop classes, because of this confusion.

Early in the work of the committee, questionnaires were sent to 900 organizations interested in mechanical drawings asking for details as to their individual practice. These answers were codified and were used as the basis of the first draft of the standard.

The work was divided into six important phases of drawing; namely:

Specifications for Paper and Cloth. On the subcommittee on this subject A. A. Coburn, representing the U. S. Army Chief of Ordnance, served as chairman.

Edmund B. Neil, mechanical engineer with N. W. Ayer and Son, Inc., was chairman of the subcommittee on Methods of Indicating Dimensions.

The subcommittee on Lettering was headed by Thomas G. Crawford, General Electric Company, Schenectady, N. Y.

Drawing Layout was studied by a subcommittee headed by Fred G. Wolff, American Car & Foundry Company, New York.

Samuel Ketchum, Treadwell Company, Inc., New York, was chairman of the subcommittee on Line Work.

G. H. Drake, succeeded by Prof. Thomas E. French, served as chairman of the committee on Graphical Symbols for Drawings.

The Society for Promotion of Engineering Education and the American Society of Mechanical Engineers took the leadership in the work and were sponsors of the project.

◆ Symposium on Program of Chemical Society Meeting

A symposium on the subject, "Wood as a Raw Material for Chemical Commodities" will be a feature of the program of the American Chemical Society meeting, San Francisco, Calif., August 21, 1935.

The symposium is outlined as follows:

1—Introduction (10 min.) by Chairman H. K. Benson, University of Washington, Seattle, Washington.

2—Sub-microscopic Structure of Cellulosic Fibers (20 min.), O. L. Sponsler, University of California, at Los Angeles.

3—Micellar Structure as Related to Cellulose (20 min.), James W. McBain, Stanford University, California.

4—The Polyuronides of Wood (30 min.), Ernest Anderson, University of Arizona, Tucson, Arizona.

5—Lignin of Wood (30 min.), Walter M. Fuchs, New Jersey Agricultural Experiment Station, New Brunswick, New Jersey.

6—Chemical Derivatives of Wood (30 min.), Ralph E. Montonna, University of Minnesota, Minneapolis.

◆ No More Ghost Towns in New York

"Ghost towns" so-called because of their wraith-like resemblance of their former proportions henceforth will be largely prevented in New York State if the program contemplated in the plan for the future administration of the idle land and marginal land in New York is eventually worked out, says the New York State College of Forestry at Syracuse University.

Nine million acres of forest land to be owned by the State and virtually half of that administered as commercial forests for the production of timber is the plan for the future in New York. Such a forest will bring about the reduction of these skeleton communities or the reincarnation of them never again to decline or pass from the field of active, prosperous communities. They will have industries founded on a permanent basis because back of them will be permanently producing forests. More than four million acres of producing forests should give constant employment to approximately one hundred thousand men and supply materials which elsewhere indirectly would bring employment to thousands more.

Sheet Machine Design Considerations

The article on "Sheet Forming and Slowness Testing" by Arthur B. Green, which appeared in the June 1935 issue of THE PAPER INDUSTRY, elicited some comment from James d'A Clark, the designer of the apparatus specified in T.A.P.P.I. method T 205m. His comment in part is reproduced herewith as is also a statement from Mr. Green in replication.—*Editor's Note.*

Comment by Mr. Clark

. . . The substitution of a cylinder carried some distance below the base screen, for the special design of the standard apparatus, would have eliminated the necessity for the four bladed baffle, but in no way would it have improved the uniformity of the sheet or have made the apparatus any easier to clean. The disadvantages of the extended cylinder are (1) the additional space beneath the wire, which requires to be filled with water two or three times during the making of a sheet and the washing of the wire preparatory to making the next one. This consumes appreciable additional time as anyone knows who has operated both forms of apparatus. (2) For certain investigations, it is desirable to collect and re-use the white water from the sheets. The presence of a large additional volume of diluent water beneath the wire makes such an operation very inconvenient and, in fact, almost impossible.

Regarding the gaskets round the grid plate, two are required to provide a seal, not three as stated, the third one being for the removable seal ring which is not used during the making of the sheets, but which is employed only as an additional precaution against air leakage when accurately determining the drainage time of very slow stock.

Referring to the screen itself, it would be nice to use "a simple piece of perforated metal," but unfortunately the use and clamping of such a sheet of metal as suggested will not ensure its being flat, which is essential to the making of a perfectly uniform sheet. What is *not* claimed for the perforated metal and what *is* claimed for the standard screen is approximately the same retention of fines and filler in the laboratory made sheet as that obtained on the average paper machine, because the greater dilution of the stock in the sheet machine and consequent loss of fines, is balanced by the use of a much finer mesh of wire. This is a very important and is an inherent quality which has largely contributed to the practical success of the standard equipment.

Now as to couching. We are not concerned as to what is good for the sheet but what most nearly simulates mill practice. To neither couch nor press a sheet while moist gives a weak bulky porous sheet, the properties of which bear little, if any, relation to the same pulp made into paper on a commercial machine.

Finally, there would seem to be some inference both in the drawing and the text that the construction of the standard equipment is unduly cumbersome and complicated. In the first place, a 4-inch deep cylinder does not permit of sufficient dilution of the stock to form as uniform a sheet as does a cylinder 14 inches deep. This is easily demonstrated by anyone using a tall cylinder. In the second place, the construction of the simplified machine may at first sight appear to be more compact but obviously, as shown, it would have to be operated on the floor by someone kneeling before it, or if on a bench, then with hands raised. . . . No provision is made to prevent water splashing over the operator when the wire is washed, no valve is shown to control the fresh water going to the instrument, no trap is shown in the water leg which is essential to ensure uniform drainage times and even no drainage valve is indicated. . . .

There are today nearly seventy sets of the standard apparatus scattered throughout the papermaking world and there are a number of mills in the United States, Canada and Great Britain, which are now purchasing their pulp requirements on specifications based on tests secured by its aid.

Mr. Green's Statement

The depth of the cylinder above the screen is a matter of choice. I do not agree with Mr. Clark that high dilution along with fine mesh screen is preferable in the great majority of cases. Laboratories equip with the simplified mould because of its ease of leveling, portability, and absence of special provisions for installation. (A bench will not hold the T.A.P.P.I. suggested mould without permanent carpenter work and plumbing). The screens are used preferably to dry the sheets on; there are as many screens as there are sheets made. The washing which causes spatter is not part of the operation. Connection is made by rubber hose with a faucet to fill the mould with fresh water, and the rubber stopper at the bottom of the draft tube provides the quickest release that can be made. A valve can be used instead, but it is slower. No trap at the bottom of the draft tube is needed if two other factors are properly designed:—Diameter of draft tube, and total draft. . . . The space below the screen is, of course, not refilled every time a sheet is made. When the water column in the draft tube breaks, the sheet is formed, and in most cases the water has descended only a little way below the screen.

The space below the screen detracts not a bit from the ease of collecting white water. The operator starts collecting white water after the third or fourth sheet, instead of after the second or third.

Tightness around the edges of the screen I regard as desirable even for making sheets, a point that manifests itself when the edges of the sheet are examined. Three gaskets are not necessary, if one makes the job tight.

Perforated metal mechanically clamped between machined faces is held flat. An extreme draft would be needed to pull it down. . . .

Making a sheet mould for purposes of standardization, for writing specifications, and for research, to simulate the paper machine I regard as the same mistake as to make a laboratory beater to simulate a mill beater. One reason is that obviously it can only be done very imperfectly. Another is that the sheet mould is made to study and measure stock and its properties, not the paper machine and its peculiarities. . . . Throwing into the laboratory sheet all the errors of fourdrinier machining before studying the sheet is, to my mind, going at it backwards. Make the sheet as free from these machining errors as possible, if there is any expectation of learning what the paper machine ought to do. . . .

◆ ◆

◆ Dr. Partridge now with Hall Laboratories

Dr. Everett P. Partridge, well known for his research on boiler-water problems, has been appointed director of research of Hall Laboratories, Inc. In this position which he will assume on September 1, Dr. Partridge will be associated with Dr. Ralph E. Hall, the managing director of Hall Laboratories and his staff, with the scientific and technical specialists of Hagan Corporation, The Buromin Company, and Calgon, Inc., all of which are allied organizations, and also with the incumbents of the Industrial Fellowship on Calgonizing sustained by Calgon, Inc., at Mellon Institute of Industrial Research.

Dr. Partridge has written extensively for various scientific and technical journals. As director of research of the Hall Laboratories, he will continue his interest in boiler-water treatment and in the processing of water for general industrial use.

◆ NEW ENGLAND sales offices of Robert Gair Company, Inc., and subsidiaries has been removed to 77 Sumner Street, Boston, Mass. Telephone, Liberty 5125-6. Arthur J. Wallace is manager.

The Norwegian Pulp and Paper Industry[1]

OF THE total area of Norway, 23 per cent is covered by forests, and it is, therefore only natural that the production of pulp and paper plays an important role in the national economy. Close to one-fourth of total Norwegian exports consists of pulp and paper; and this industry is particularly important in view of the number of people employed, not only in the mills themselves, but to an even greater extent in the forests and along the rivers and streams, for the procurement of all the wood required as raw material.

The first paper machine was started in Norway in 1838, and a number of pulp and paper mills were established during the following decades, although actual production reached only about 60,000 tons per year by the turn of the century. But from that point and until the outbreak of the World War, a number of new units were started, and production was stepped up considerably. In later years, few new mills have been built, but, on the other hand, existing plants have been modernized extensively.

Pulp Mills

There are today in Norway a total of 69 groundwood mills, and 25 chemical pulp mills; a number from both groups being combined with paper mills. Capacity of production is as follows:

	Metric Tons
Mechanical Pulp (groundwood)	697,000
Chemical Pulp, Sulphite	450,000
Chemical Pulp, Sulphate	90,000

During the past few years, the above producing capacity has only been utilized in part, due to general conditions throughout the world. The principal European producers of *mechanical pulp* have agreed to limit production to 50 per cent of capacity since 1931; and quite recently, the Norwegian, Finnish and Swedish mills arrived at an agreement whereby the total output for export was fixed at 1,750,000 tons for the three countries, of which 650,000 tons for Norway, 600,000 tons for Sweden and 50,000 tons for Finland.

Regarding *chemical pulp*, the European producers have agreed to limit the output during 1935 and 1936 to 75 per cent of total capacity.

Of the wood pulp produced in Norway, over two-thirds is exported, while the remainder is converted into paper and paperboard in Norwegian mills. The following is a summary of export figures:

	Mechanical Pulp Metric Tons		Chemical Pulp Metric Tons	
Year	Dry	Wet	Dry	Wet
1913	14,661	481,080	209,544	1,635
1929	3,580	596,648	269,177	11,099
1932	3,528	605,517	250,133	17,046
1934	4,254	691,997	243,954	12,038

For mechanical pulp, the principal markets, in their order of importance, are: Great Britain, France, Belgium, United States, Denmark, the Netherlands. Exports of chemical pulp go principally to: Great Britain, United States, France, British East India, Japan, Italy, the Netherlands, Belgium, Germany.

It is particularly interesting to notice that production of silk (rayon) pulp is on the increase, for the reason that Norwegian silk pulp is decidedly appreciated by silk factories in other countries. Plans are now maturing for the construction of a silk factory in Norway, to cover Norwegian requirements for rayon materials. Total exports of bleached sulphite pulp was close to 179,000 tons in 1934, of which quantity 83,000 tons represented silk pulp.

Paper Mills

There are in all about fifty paper mills and board mills in Norway. Total production of paper and board reached an all-time high of over 400,000 tons in 1929. Total producing capacity is 480,000 tons, of which 40,000 are boards.

Roughly speaking, 85 per cent of the output is exported, and to all parts of the world. The Norwegian paper industry is thus very dependent upon market conditions in other countries. As a paper-exporting country, Norway ranks fourth in the world.

The paper production comprises all qualities, from ordinary newsprint paper and wrapping papers to the highest class printing and writing papers, both mechanical and wood-free.

Average export figures per year are:

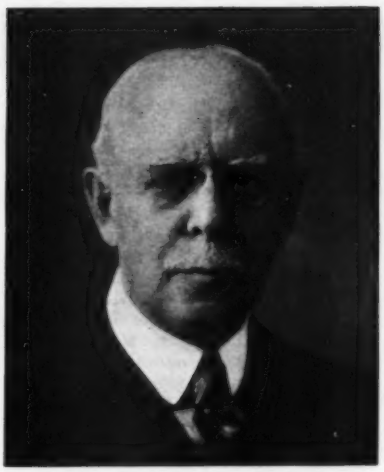
	Tons	Tons
Printing and Writing Papers:		
Of which Newsprint	160,000	215,000
Wrapping Papers:		
Of which Kraft Paper	35,000	
Tissue Paper	25,000	
Grease-proof Paper	20,000	
Others	10,000	90,000
Boards		20,000

In regard to Newsprint paper, the theoretical capacity of the Norwegian mills is roughly 230,000 tons per year. In good years, actual production has run as high as 185,000 tons, but was only 140,000 tons in 1934. Of this quantity, Great Britain consumed 31,398 tons, United States 13,374 tons, South Africa 17,181 tons, France 11,149 tons, and Belgium 7,454 tons.

(1) This article, the third of a series on Norwegian industries, appeared in the Summer—1935 issue of *Norwegian American Commerce Quarterly Bulletin*, through the courtesy of the Press Bureau of the Norwegian Foreign Office.—*Editor's Note.*

◆ ◆

◆ LINK-BELT COMPANY, Chicago, announces the appointment of Chadwick Machinery Co., Milwaukee, Wis., as distributors for the Link-Belt line of crawler shovels, cranes, draglines and locomotive track-type cranes.



Dr. Arthur D. Little

Dr. Arthur D. Little, chairman of the board of Arthur D. Little, Inc., widely-known firm of chemists and engineers of Cambridge, Mass., passed away on August first at Northeast Harbor, Maine. He was in his seventy-first year, having been born in Boston on December 15, 1863.

Dr. Little began his professional work as chemist to the Richmond Paper Company, Rumford, R. I., the first mill in the United States to manufacture wood pulp by the sulphite process. In 1886 he opened a laboratory in Boston in partnership with R. B. Griffin to engage in the general commercial practice of chemistry and to specialize in paper-mill work. Following Mr. Griffin's death in 1893, Dr. Little carried on the business alone for seven years; then, in 1900, formed a new partnership with the late Dr. William H. Walker, which partnership continued until 1909, when the business was incorporated. In 1917, the laboratories were moved to their present location in Cambridge.

For a number of years Dr. Little was official chemist to the American Paper and Pulp Association. Before the establishment of the present United States Forest Products Laboratory he investigated the paper-making quality of various American woods for the United States Forest Service. Several patents covering processes of interest to the chemical industry were taken out by Dr. Little. Among the numerous other contributions of his laboratory are several important processes connected with pulp and paper making, non-inflammable movie films, artificial silk and stereotype mats.

Dr. Little became president of Arthur D. Little, Inc., in 1909 and continued in that capacity until the early part of this year when he was appointed chairman of the board.

During his career, Dr. Little published many articles, among his best known and major literary works being *The Chemistry of Paper Making*, which was a joint contribution with R. B. Griffin; *The Fifth Estate*, and *The Handwriting on the Wall*.

Of the numerous honors bestowed

upon Dr. Little might be mentioned the honorary degree of Doctor of Chemistry conferred upon him by the University of Pittsburgh in 1918; the honorary Doctor of Science degree by the University of Manchester (England) in 1929, and corresponding degrees by Tufts College in 1930, and Columbia University in 1931. He was president of the American Chemical Society (1912-1914), American Institute of Chemical Engineers (1919), and Society of Chemical Industry (1928). He was awarded the Perkin Medal in 1931 as "the American chemist who has most distinguished himself for his services to applied chemistry."

Dr. Little is survived by his widow, formerly Henrietta Rogers Anthony, by a brother, Edward H. Little, and by a nephew, Royal Little.

◆ Improvements at Plant of Whiting-Plover

A remodeling and expansion project at the Whiting-Plover Paper Company, Stevens Point, Wis., will be completed about September 1 at a cost of approximately $150,000.

Several buildings are being remodeled and enlarged preparatory to the installation of considerable new machinery and equipment. These changes will effect changes in manufacturing processes which will result in greater production, increased quality of product and lower costs.

Manufacturing schedules have been arranged so that much of the construction work is being carried on by the company's employes during the present slack period.

◆ Mrs. Charles L. Ellis

Many friends throughout the industry have been grieved to learn of the passing of Mrs. Charles L. Ellis, wife of the vice president of Downingtown Manufacturing Co. Mr. Ellis is a former chairman of the Pennsylvania-New Jersey Division of the Superintendents Association and Mrs. Ellis became very well known by accompanying Mr. Ellis to many of the association meetings.

Mrs. Ellis passed away suddenly from a heart attack July 13.

◆ New Plant for Titanium Pigment Co.

The new plant of the Titanium Pigment Company, Inc., at Sayreville, New Jersey, has recently started production. For the present, the new plant is concentrating on the manufacture of TITANOX-A, which is finding greatly increased use in the paper field, but eventually TITANOX-C will also be produced at the Sayreville Plant as well as at the St. Louis Plant.

The new plant has been erected to take care of the heavy demands for TITANOX pigments arising not only from their increasing use in paper, but in paints, rubber, linoleum, textiles, cosmetics, etc. It is admirably suited for pigment production representing the last word in plant design and operation.

◆ B. W. Bennett

The sudden passing of B. W. Bennett, president and treasurer of Dilts Machine Works, Inc., Fulton, N. Y., on July 30, was a shock to his many friends throughout the industry. He was sixty-three years of age.

Mr. Bennett has been associated with the Dilts organization for a number of years. Following the death of Frank Butler Dilts in 1931, he was made president of the company. During his business career, Mr. Bennett was also associated with several paper mills.

◆ AT A RECENT meeting of the directors of the Improved Paper Machinery Corporation, Nashua, N. H., John H. Noble, of Pelham, N. Y., sales manager of the company, was elected a director and vice president. John P. Rich, Jr., was also elected a director.

◆ Ryerson and Inland Steel to Be Merged

The merger of the Inland Steel Company and Joseph T. Ryerson & Son, Inc., two leading Chicago steel companies, has been approved by the board of directors of each company and now awaits action by the stockholders. The completion of this merger will set up an organization with assets of nearly $117,000,000 and will place it in seventh place in the steel industry.

Under the plan, the Ryerson company will be operated under its present name and management as a wholly owned subsidiary of Inland. Edward L. Ryerson, Jr., will be one of the chief executive officers of Inland.

◆ WILLIAM L. VALIQUETTE, manager of the Seybold Machine Co., Dayton, O., and for almost 49 years identified with the company and the paper cutting industry, passed away recently at the age of 66 years. Charles Seybold, founder and former president, returns to the Seybold division as manager.

◆ H. S. Brown Elected President of Foster Wheeler

At a meeting of the Board of Directors, held July 22, Harry S. Brown was made president of the Foster Wheeler Corporation, New York City.

Mr. Brown succeeds his brother, J. J. Brown, who has held both the offices of Chairman of the Board and President for the past two years. He resigned as president but continues as chairman of the board.

At the same meeting, David McCulloch, formerly secretary and general manager, was elected executive vice president, and Walter F. Keenan, Jr., George B. Ferrier and J. J. Nelis were elected vice presidents. P. N. Wenz was elected secretary.

◆ ANNOUNCEMENT is made by Roots-Connersville Blower Corp., Connersville, Ind., that James T. Sutliff, who for a number of years has been located at the factory in Connersville, is now associated with the company's Chicago office.

Things to Consider in Selecting Gears

W. W. Sayers[1]

DURING recent years considerable study has been given to the problem of the correct selection of gearing to obtain not only quieter and smoother action but longer life as well.

The tooth form, and the accuracy of cutting and general machining are, of course, very important factors in determining the quality and length of service secured in operation. These factors are, however, universally recognized as essential and in a properly equipped and operated plant receive due attention.

One very important feature which does not seem to receive as careful attention as should be the case, is the selection of materials for gears with relation to tooth loads. This subject has been investigated by numerous engineers over quite a period of years but it is only comparatively recently that any useful information which could be directly applied to definite problems has been made available.

The well known and universally used Lewis formula for calculating the strength of gears has proved over a large period of years to be quite satisfactory for selecting gearing on the basis of strength. It does not, however, take into account the deformation of the tooth contour due to the load and it is this deformation which materially affects the life of the gears.

Contact between gear teeth is similar to that between two cylinders except that the radius of curvature of the tooth profile is constantly changing. The contact in spurs and bevels particularly, is along a line but actually the pressure between the surfaces causes this line contact to become broadened out into a surface, due to the elasticity of the materials of which the gears are made. The greater the tooth load or pressure, the wider this surface will be until finally a pressure is reached which results in permanent distortion of the metal.

Evidently, for any pair of gears there is a critical surface pressure, governed by the properties of the materials, above which the distortion is permanent and the life of the gears short, and below which the gears will have a reasonably long life without appreciable wear.

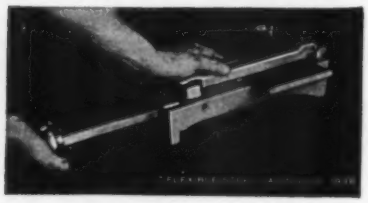
It is not yet possible to predetermine definitely the life of any particular pair of gears. Formulae have, however, been developed which assist in the selection of gear materials to take care of definite unit tooth loads. This data, when used in conjunction with the results obtained from the Lewis formula, can be relied on to give reasonably correct information concerning the chances of the gears' giving satisfactory service.

Necessarily, practical experience in the use or such formulae is essential before proper use can be made of the calculated results.

(1) Published in August 1935 issue of *Link-Belt News*.

◆ Side-Cut Belt Cutter

The Flexible Steel Lacing Co., 4607-31 Lexington St., Chicago, has announced a newly developed and patented flat belt cutting tool, the Alligator belt cutter, for belts up to 8 inches in width. The cutter knife is of special alloy steel and is mounted on a plunger which operates lengthwise of the tool frame.



Likewise, the knife extends upward through a slot in the frame to make its cutting contact with a belt. An equalizing clamp holds the belt tightly during the cutting operation and at the same time serves as a guard for the knife. This clamp is hinged from the top of the frame at the rear. Both the clamp and frame are of aluminum alloy.

◆ Barrel Pump for High Pressure Lubrication

A high pressure, air-operated barrel pump, designated as HP-100, is one of the recently announced items of the Alemite Division, Stewart-Warner Corporation, Chicago. This pump converts any original 100-pound lubricant container into a power gun for industrial and truck lubrication—a low pressure pump carrying a continuous flow of lubricant from the container to a high pressure pump which delivers regular lubricant at the rate of 18 oz. per minute or extremely fibrous and heavy lubricants at about one-third this rate. A

pressure, 33 times the air pressure used, is available to furnish a delivery sufficient to take care of several outlets at one time.

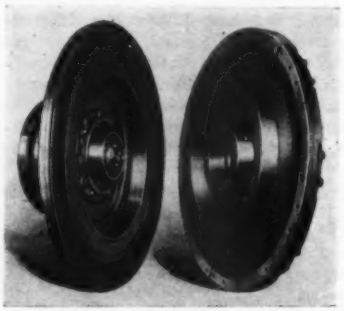
Removal of the barrel pump's top cover, held in place with one bolt, gives access to all the working parts of the double action air motor. The check valve of the unit may be cleaned without detaching the hose from the gun.

This pump, chrome plated and maroon finished, is provided with either a three- or four-wheeled truck for portability or with a base for stationary installation.

◆ General Purpose Magnetic Clutch

Cutler-Hammer, Inc., 289 North 12th Street, Milwaukee, Wis., has introduced a new design of general purpose magnetic clutch in which the inner circumference of the field ring is threaded. Adjustment of the friction faces to compensate for wear and to assure uniform lining engagement is made by rotating the field ring in respect to the magnet field member, and consequently moving it toward the friction surface on the armature member. When it is moved forward sufficiently, it is locked in position.

A floating magnet armature is used



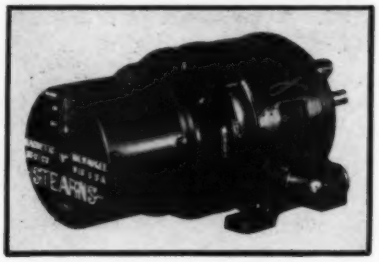
in this design of clutch. This feature, it is said, makes it impossible to score the magnet pole faces even if proper adjustment on the lining is not maintained. Other features of the new design include a magnet coil which may be removed and replaced as a unit, rugged bronze collector rings, a lining wear indicator, and a pilot bearing to insure concentric engagement of the two members. Complete information upon this design of clutch will be sent by the manufacturer upon request.

◆ Laboratory Stirrer

The Chemical Publishing Co. of N. Y., Inc., 175 Fifth Ave., New York City, is offering to the trade a laboratory stirrer that is stated to be not just another mixer but a sturdy, well-built accessory for making emulsions and for dissolving dyes, gums and resins, waxes and bitumens, pyroxylin, casein, glue, gelatin, starch, salts, etc. The stirrer is actuated by a shaded pole type motor (110 V. 60 cycles) which, it is claimed, will not be injured by fumes and vapors. It is also claimed to be non-sparking. A rheostat permits the speed to be varied as needed. The shaft of the stirrer and the propeller are furnished in chromium plate or Monel. A flexible six-foot rubber-covered cord and a soft rubber plug are included with the apparatus. The stirrer may be fitted to an ordinary clamp holder or may be screwed to a shelf or wall.

◆ New Magnetic Disc Brake

The Magnetic Manufacturing Co., Milwaukee, Wis., is now placing on the market a new magnetic disc brake. This brake, designated as the "Stearns" High Duty Style "DS" disc brake, can be made for floor or motor mounting, and can be supplied for either a.-c. or d.-c. operation. Five sizes, ranging from 10 to



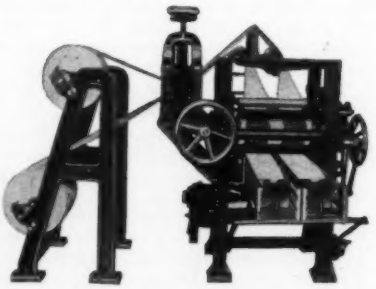
90 foot pounds torque, are now in the course of production for continuous duty operation.

Among the outstanding features of this brake, as mentioned by the manufacturer, are: manual release, lining wear indicator, constant torque provided at all times and not subject to variation from lining wear, simple and practical adjustment for torque and lining wear, and easy replacement of linings when necessary.

◆ Beltless Napkin Folder

A napkin folder in which all belts have been eliminated has been developed by the Paper Converting Machine Company, Green Bay, Wis. On this machine a packing paddle passes into grooves in the folding roll; folded napkins are carried down in front of it; and the napkins are then packed directly in the receiving magazine. Folding is done by vacuum similar to the regular system except that a three-time roll is used.

It is claimed by the manufacturer that the elimination of belts makes it



possible to increase the speed from 100 to 150 more napkins per minute. The manufacturer also states that additional units such as printing, embossing and die inking can be added to this folder in either the single or double type.

◆ Rubber-Lined Valve

A rubber-lined valve, suitable for handling corrosive and abrasive fluids under pulsating pressure, throttling, suction or fairly high pressure condi-

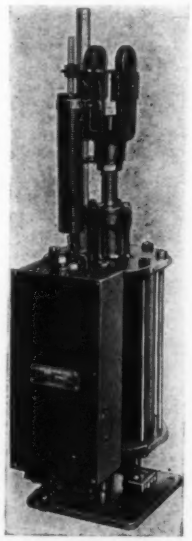
tions, and of simple, rugged design, has been announced by The B. F. Goodrich Co., Akron, Ohio. The valve may be lined with any of the standard Goodrich Acidseal compounds, hard or soft, depending upon conditions of service, the lining being bonded to the metal parts by the patented Goodrich Vulcalock process. A resilient, rounded disc which snaps over a circular plate at lower end of stem provides a seal when brought into contact with a molded rubber-covered seat ring.

Both disc and seat ring are simple and easily replaceable. The molded seat ring can be removed simply by taking off the body bolts. This ring is double seated and reversible. On sizes up to and including 6 inches there is no restriction of flow through it.

By reversing the lower body section and replacing the bolts, the Vulcalock valve may be changed from a straightway valve to an angle valve or vice versa.

◆ Air Operated Combustion Control

A new air-operated combustion control which has been designed to automatically maintain steam pressure, furnace draft and maximum combustion in the operation of boilers has been developed by Bailey Meter Company, Cleveland, Ohio. The control system is based upon the accurate measurement of all factors involved by standard Bailey recorders in which are incorporated free floating air pilot valves, valves constructed to neither decrease the accuracy or limit the operating ranges of the devices by which they are actuated. Complete flexibility of the system is provided by selector valves on the master and individual boiler panels. These selector valves provide for complete or partial automatic control, manual control and boiler load adjustment. The position of equipment under control is indicated by a pointer and dial on the selector valve.



◆ Priming Compound for Self-Vulcanizing Rubber

A new priming compound for use with a self-vulcanizing rubber that can be applied in either liquid or plastic form has been announced by the Self-Vulcanizing Rubber Co., Inc., 605 West Washington Boulevard, Chicago, Ill. It is claimed by the manufacturer that good results in rubberizing are possible with either the liquid or plastic rubber after a preliminary application of a single priming coat with this primer—the liquid rubber being applied by brush, spray gun, dipping or pouring—the plastic with a spatula or other flat tool. Both of these products, known as Self-Vulc, vulcanize themselves when exposed to the air.

It is further claimed that these products do not deteriorate with age but that they retain their resiliency and rubber qualities indefinitely, withstanding heat up to 200 deg. Fahr. and cold to 120 deg. below zero.

Some specific uses for the liquid and the plastic rubber that have been suggested are: Restoring and renewing wearing surfaces of conveyor belts; coating inside of mixing tanks, chutes, flumes, hoppers, tubs, and bins as a protection against abrasion and corrosion; waterproofing and renewing insulation of electric cables, wires, and wire joints; and covering parts of pumps, blowers, fans, impellers, exhaust stacks and hoods to prevent corrosion and wear and to silence noises.

◆ Total Time Meter

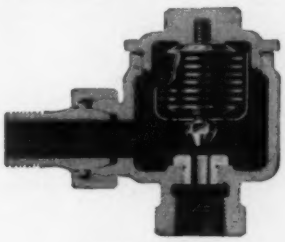
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has announced a meter for totalizing running or idle time on electrically operated machinery. This meter, designated as Total Time Meter, registers hours and is stated to be suitable for any application where it is desirable to know the total number of hours during which a circuit is energized or apparatus is in operation. The registering mechanism has four dials and will register 9,999 hours before repeating, approximately 400 days. Where desired, such a meter can be mounted in the superintendent's or foreman's office and connected from there to the machine by a single pair of wires.

◆ A New Cast Iron Pipe

A cast iron pipe, designated as Hi-Test and suitable for water working pressures of 175 lb. per square inch, has been announced by the Walworth Company, 60 East 42d Street, New York City. This pipe is furnished regularly in sizes 1¼ in. to 6 in. inclusive, in 20 ft. lengths, with threaded joints and can be supplied in lengths of 5, 10 or 15 ft. Cast iron used in this pipe is claimed to have an ultimate tensile strength of 35,000 lb. per square inch while the minimum bursting pressures for the threaded pipe is said to range from 7,000 lb. per square inch for the 1¼-inch diameter size to 1,500 lb. per square inch for the 6-inch size.

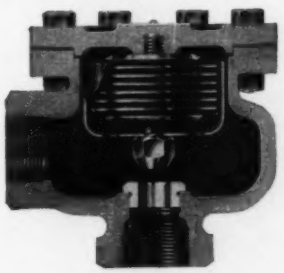
◆ Steam Traps of New Design

Two new models of steam traps have just been introduced by W. H. Nicholson & Company, 200 Oregon Street, Wilkes-Barre, Pa., the style "AU" and style "C." The style "AU" trap, with a union connection and of bronze construction, is adaptable for use on unit heaters, small steam heated industrial units on process work, and radiators. The bellows of this



Style "AU"

trap are made from phosphor bronze tubing hydraulically formed, and with end plates brazed on and not soldered, which allows the trap to withstand high pressures and temperatures. The style "C" trap is of cast iron construction and is suitable for pressures up to 200 lb. It is made in angle type so that the trap drains itself when steam is turned off, a



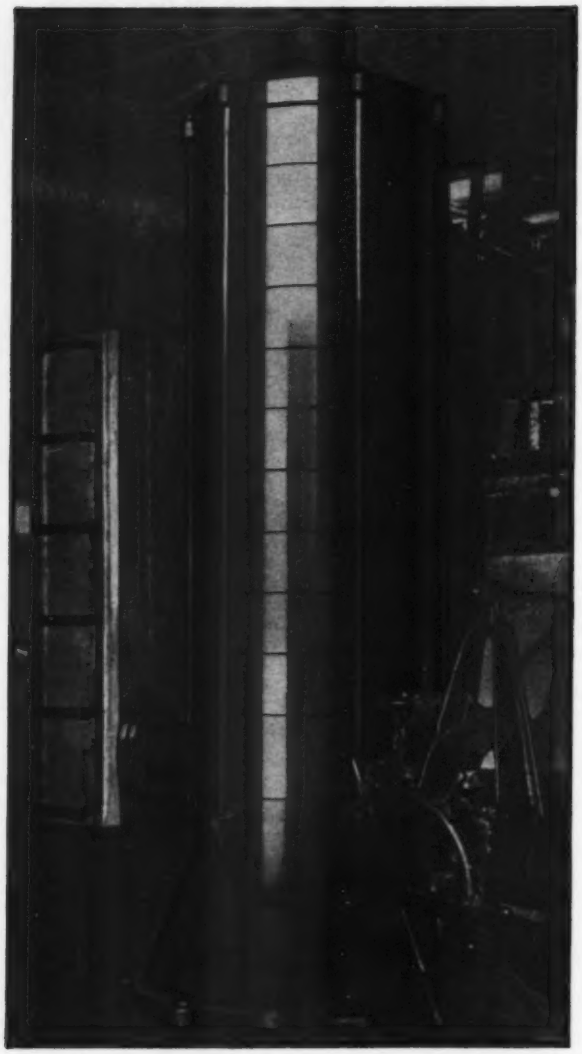
Style "C"

desirable feature on outside installations as it prevents freezing. This trap also has a brazed bellows element which gives it an intermittent discharge and a large capacity for both water and air. Valves and seats are of hardened stainless steel.

Bulletin No. 535 describes in more detail both of these traps as well as some of the other traps of the manufacturer.

◆ General Duty Welding Torch

A new welding torch, known as the Purox general duty welding torch, has been announced by The Linde Air Products Co., 30 East 42nd St., New York, N. Y. This torch with silver soldered tubes is constructed of extruded brass, Monel metal, and drawn copper. Connections are ferrule type and extend parallel to axis of handle. Individual mixers in each welding head are so designed that maximum resistance to flashback is afforded and at the same time the effective range of each size tip is increased. It is stated that nine tips perform the duty of fifteen, and that the torch is equally adaptable to the lightest as well as the heaviest work to be found in any welding shop.



No Longer a Dilemma

Have you ever pondered to yourself—"My stock requires more beating. I need more beaters but where can I possibly install them in my present layout?" ◆ The manager of one mill making high grade sulphite papers worked himself out of just such a predicament by installing a FRITZ REFINING AND HYDRATING MACHINE. After using this machine for four years, a working period long enough to satisfy the most leery, he wrote, "If it were not for our FRITZ REFINING AND HYDRATING MACHINE, we would have to buy more beaters and put up another building to house them." ◆ If you are troubled by a similar situation in your mill, there is no more need for you to let it continually bother you. Look into the possible use of the same machine that solved your neighbor's problem. ◆ Simply write for all the facts about the FRITZ REFINING AND HYDRATING MACHINE to **LOVE BROTHERS, Incorporated, AURORA, ILLINOIS.**

◆ Pulling and Lifting Tool

A tool that may be used horizontally for stretching cables, pulling in boiler tubes, pulling machines into position, or for countless other purposes, and vertically as a hoist to lift all types of loads up to six tons is the newest development of the engineers of The Yale & Towne

Manufacturing Company, Philadelphia, Division, Philadelphia, Pa. This tool, designated as Pul-Lift, is made in ¾, 1½, 3 and 6 ton capacities. A Weston type of self-actuating load brake holds the load firmly at all times; moving parts are enclosed; and the load hooks are of heat-treated drop forged steel. It is said to be easy to operate in any position.

◆ Paper for the Use of the Devil

Two Swedish scientists, Sigvald Linne and Gösta Montell, on their way home from research work in Mexico, have interesting reports to make of the primitive tribes in that exotic land.

Among other things, they came upon a tribe of primitive Indians who have a well-developed paper industry of their own. This tribe, known as the Otomi, makes coarse and finished paper with the simplest of stone tools.

The paper is not destined for the literary efforts of the tribe. Its only use is in connection with the magic or devil worship of their religion. The paper made with so much trouble and care is cut out by the witches of the tribe into silhouettes of devils and other fearsome things which are used for magic of various kinds. (From July issue of *Paper Making and Paper Selling.)*

◆ New Catalogues and Publications

Allis-Chalmers Manufacturing Co., Milwaukee, Wis.—A new leaflet, No. 2202, is devoted to this company's Synchro-Operator, a new device which automatically performs all the functions necessary to synchronize generators so they will operate in parallel. The descriptive matter is amply illustrated and there is a reproduction of a graphic record of a synchro-operator's performance.

American Engineering Co., Philadelphia, Pa.—A new 44-page catalogue features the Hale-Shaw Pumps, manufactured by this company. The catalogue contains more than 100 illustrations, also charts, tables, drawings and engineering data indicating the construction, operation, application and specifications of Hale-Shaw pumps, motors, transmissions, regulators, pumping units, differential valves and pipe testing machines. One illustration shows the application of the Hale-Shaw transmission to a paper winder. Copies on request to engineering, designing and manufacturing executives.

Bailey Meter Company, Cleveland, O.—A 32-page bulletin entitled "Air Operated Combustion Control" describes a complete combustion control system which automatically maintains steam pressure, combustion efficiency and furnace draft. Diagrams and photographs illustrate how the system may be applied to boilers ranging in size from 200 hp. up and fired either with fuels in suspension or with stokers.

Bantam Ball Bearing Co., South Bend, Ind.—Manual No. 12 is a new general catalogue which, while concise, gives a thorough treatment of load carrying capacities, proper mountings, lubrication and other pertinent information on ball and roller bearings. In compiling this information, the company drew from its wide experience in the field of anti-friction barings. The new catalogue is loose-leaf, with embossed cover. It is divided into the following sections: Tapered roller bearings; straight radial roller and roller thrust bearings; quill roller bearings; printing press bearings; as well as a section devoted to engineering data. There are a large number of tables and the book is well illustrated. Copies will be sent gratis to operating officials, engineers and designers.

Gates Rubber Co., Denver, Colo.—The installation and operation of V-belt drives is discussed in a new simplified 48-page book on V-belt engineering, just published by this company. The book has been made so simple to use that the Gates company claims any drive can be completely designed and the delivered price determined from this one text. There is a section on the care of V-belt drives. Other sections include: complete instructions for the design of V-V drives, quarter turn drives, double-V drives and V-flat drives. Copies on request to those interested in power transmission.

Johns-Manville, New York—More than 50 of the J-M insulating products, of which there is one for every temperature from 400 deg. below zero to 2500 deg. Fahr., are described and illustrated in a handy little booklet entitled "Barriers to Industrial Waste" which has just been published. The table of recommendations for insulating materials in this booklet covers heating and power, ovens and dryers, heat treating furnaces, oil refinery, steel mill, non-ferrous smelting, ceramic, gas making, refrigerating and brewery equipment, hot and cold pipes and other industrial equipment requiring insulation. Copies of the booklet, No. IN-7A, on request by addressing the New York offices, 22 E. 40th St.

Lawrence Machine and Pump Corp., Lawrence, Mass.—Lawrence High Duty Multi Stage Pumps are described in Bulletin 204 just published. The construction of this type of pump, which is especially adapted for high pressure service as for water works, boiler feed and industrial uses, is explained. There are illustrations and a sectional drawing.

Manhattan Rubber Mfg. Div., Passaic, N. J.—An attractive new bulletin describes this company's Condor Whipcord brand of endless transmission belting. In addition to the descriptions, specification and sectional and installation views of the product, the bulletin contains valuable technical data on how to determine properly the length of endless belts and also horsepower tables.

Metallizing Company of America, Inc., Los Angeles, Calif.—A 4-page pamphlet covers the use of metal spraying equipment on general maintenance applications. There are photographs of metallizing jobs that have been in service a number of years and also lists hundreds of maintenance applications to which the equipment is being put by industrial users.

Norton Company, Worcester, Mass.—Two very interesting pieces of new literature are: A booklet entitled "Norton Diamond Wheels," in which the story of diamonds in grinding wheels is related; and "Norton Abrasive Cut-Off Wheels." These books are well illustrated, the text is concise but entertaining and instructive, and they are well printed.

Palmer-Bee Co., Detroit, Mich.—This company has issued a new catalogue devoted to its screw or spiral conveyor machinery, comprising Section 107 of its General Catalogue 100. The descriptive matter is divided into sections and is well illustrated. There are a large number of dimensional tables, capacity charts, and other useful data. The book is attractively bound and indexed for ready reference.

Wm. Powell Company, Cincinnati, Ohio—A new bulletin illustrates a new line of Powell valves which are being advertised for use with Type M. copper tubing. They are described as streamline or soldered joint end valves. The bulletin describes the mechanical features of bronze, globe and angle valves, which are also illustrated.

J. O. Ross Engineering Corp., New York City—This company has just issued a bulletin describing and illustrating the modern Ross-Grewin Vapor Absorption System, of which it is claimed 150 installations are in operation. The system is clearly described, and there are several illustrations showing application of equipment in paper mill operations. Paper mill executives may obtain this bulletin upon request.

Smoot Engineering Corp., Chicago—A 32-page Data Book, No. 5-20, takes up the subject of mechanical combustion control. It contains a complete discussion of the basic problems of boiler operation and an evaluation of their importance in the final result—efficient steam generation. The book is fully illustrated and contains a number of full page diagrams showing the application of mechanical control to various types of boilers and fuel firing equipment. Copies on request.

BOOKS

The Swedish Timber & Woodpulp Journal—To celebrate its 50 years of existence, this publication has issued a jubilee number with 308 pages. The history of the journal is related from its foundation up to the present time. Also, the Swedish timber, woodpulp and paper industries of the past 50 years are reviewed. The jubilee number likewise contains a survey of the timber, woodpulp and paper industries of 1934 with statistical figures. There are descriptions of new mills and technical novelties in these branches. The jubilee issue may be ordered from A/B Svensk Trävaru Tidning, Kungsgatan 17, Stockholm, at a price of 3/6d, postfree.

MISCO "C"
THE CORROSION RESISTANT ALLOY
CAST • ROLLED • FABRICATED
for all equipment exposed to corrosion by sulphite acids
MICHIGAN STEEL CASTING CO., DETROIT, MICH.

LaMOTTE SERVICE
pH Control—Boiler Feedwater Control—Chlorine Control
Standard Routine Tests Developed by LaMotte Research Department Promote Better Control of Processes

pH CONTROL
in the Beaters
in the Sizing
in Pilling, Coating, and Coloring
in Eliminating Deposition of Pitch on Wires, Rolls and Felts
in White Water Recovery
in Quality of Mill Water Supply
in Finished Paper

CHLORINE CONTROL
in Treating Mill Water Supply, etc.

BOILER FEED WATER CONTROL
Simplified Outfits for Controlling Treated Water or in Analyzing Untreated Water for: Alkalinity . . . Chlorides . . . Dissolved Oxygen . . . Hardness . . . Phosphates . . . pH . . . Sulphates

La Motte Outfits are accurate, they are inexpensive, and they are easy to operate. Send for further information.

LaMOTTE CHEMICAL PRODUCTS CO.
436 LIGHT STREET BALTIMORE, MD.

1864 *The Qualifications of* 1935
EXCELSIOR FELTS
are embodied in their name

Elimination of felt marks
Xactly as you want them
Carefully manufactured
Easy starting and non-blowing
Lasting qualities
Satisfying performance
Immeasurably successful
Order today and
Reduce your felt costs

CYLINDER WETS
(Open and water shedding)

71 years of experience in felt manufacture.
Maximum tonnage obtained if run over

EXCELSIOR FELTS

Manufactured by
KNOX WOOLEN COMPANY
CAMDEN, MAINE

Sold by
BULKLEY, DUNTON & COMPANY
75 Duane St., New York, and direct

"AN ARMY TRAVELS ON ITS STOMACH," Napoleon said. And in this new day of industrial nervousness, the well-managed Commissary will foster company loyalty and soften labor agitation. Spirit and efficiency increase wherever proper food is provided to fit the needs of the man on the job. This Commissary Manager, with a long line of industrial successes, will negotiate with companies where qualified management in employee food and stores is appreciated. References include hotel, factory, transportation, etc. Address Box 230, THE PAPER INDUSTRY.

FOR SALE—Two 64" Norwood Super Calenders. Paper filled rolls, complete with drive. A-1 condition. Address Box 231, THE PAPER INDUSTRY.

CORROSION RESISTING LININGS
STEBBINS
ENGINEERING & MANUFACTURING CO.
SEATTLE WATERTOWN, N.Y. MONTREAL

CARTHAGE MACHINE CO.
Carthage, New York
» » »
Machinery for Ground Wood and Chemical Pulp

For The Papermaker's Library

Papermaking Research Around the World, by Dr. Louis E. Wise.

Identification and Microscopy of Woods and Wood Fibers Used in the Manufacture of Pulp, by Ellwood S. Harrar and J. Elton Lodewick.

Lessons in Paper Making, Part 1, by Harry Williamson.

Lessons in Paper Making, Part 2, by Harry Williamson.

Practical Helps for the Mill Man.

Each one of these publications contains a wealth of information, and they are priced at only fifty cents per copy prepaid.

THE PAPER INDUSTRY
333 North Michigan Avenue
CHICAGO ILLINOIS

◆ T.A.P.P.I. Fall Meeting Technical Program

G. E. Landt, chairman of the Program Committee, has announced the following as the program for the fall meeting of the Technical Association of the Pulp and Paper Industry to be held at the Ambassador Hotel, Atlantic City, N. J., September 18 to 21, 1935.

Thursday, September 19, 1935

The Cellulose Fiber from the Standpoint of Paper and Pulp Manufacture.

1—The Morphology of the Cellulose Fiber, by Dr. G. J. Ritter, Forest Products Laboratory, Madison, Wis. (This paper covers the principles of fiber growth and structure of the more usual papermaking fibers, especially as related to problems of paper and pulp manufacture.)

2—The Colloidal Aspects of the Cellulose Fiber, by Dr. B. W. Rowland, Institute of Paper Chemistry, Appleton, Wis. (Reviewing the characteristics and behavior of the fiber from a colloidal point of view.)

3—Pulping Treatment and Fiber Properties, by Dr. G. A. Richter, Brown Company, Berlin, N. H. (The chemical aspects of pulping as affecting fiber properties. To develop the basic chemical factors of pulp and pulping treatment as affecting fiber and paper properties.)

Friday, September 20, 1935

The Principle Governing the Formation of a Sheet of Paper.

1—Mechanical Treatment of Fibers as Affecting Sheet Structure, by R. H. Doughty, Fitchburg Paper Company, Fitchburg, Mass.

2—Principles Governing the Arrangement of Fibers on the Fourdrinier Wire, by A. M. Lund, Mazer Paper Mills, Lansdowne, Pa.

Discussion

(A) From point of view of Rag Paper.
(B) From point of view of Sulphite Paper.
(C) From point of view of Kraft Paper.
(D) From point of view of Groundwood Paper.

3—For Formation of Cellulose Membranes, by Wanda K. Farr, Boyce-Thompson Institute, Yonkers, N. Y.

Saturday, September 21, 1935

1—Drying of Pulp and Paper II Effects of the Principal Variables on the Rate of Air Drying; Mechanism of Drying of Pulp Sheets, by D. W. McCready, University of Michigan, Ann Arbor, Mich.

2—Tolerance in White Water Losses, by C. M. Baker, American Paper and Pulp Association, Madison, Wis.

3—Color Analysis and Specification, by Joseph Razek, University of Pennsylvania, Philadelphia, Pa.

4—Effect of Temperature and Consistency in Mechanical Pulping, by E. R. Schafter and J. C. Pew, Forest Products Laboratory, Madison, Wis.

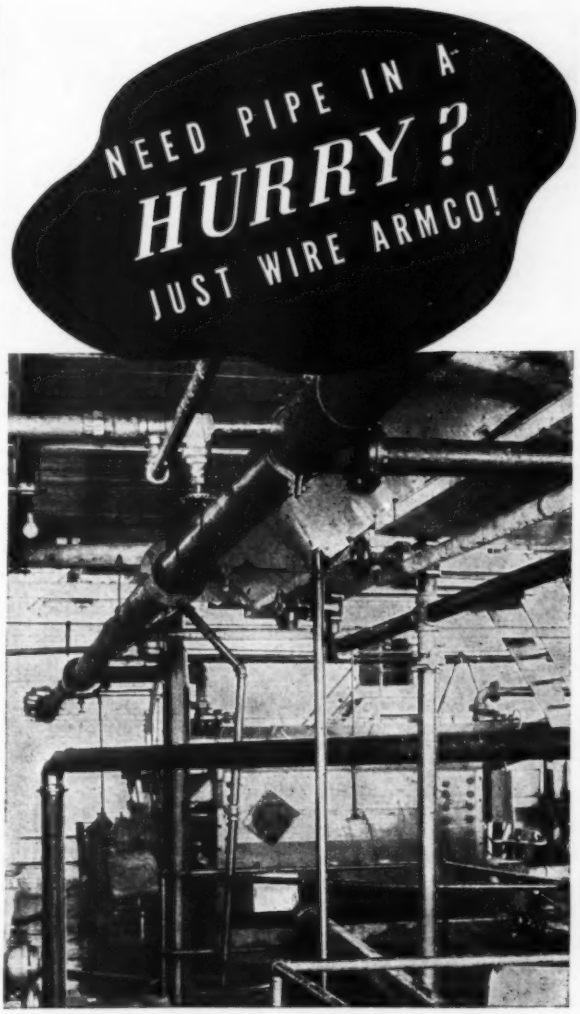
Ladies Program Being Prepared

Because of the rapidly increasing proportion of wives and families of members and their friends who are attending T.A.P.P.I. fall meetings very special plans are being prepared for their entertainment.

Mrs. Harvey P. Cannon has been appointed chairman of the Ladies Committee and since she has attended previous T.A.P.P.I. meetings and numerous other conventions, she knows what she needs to know about providing an enjoyable program that will make the Atlantic City meeting memories live long in the minds of the many ladies who will attend.

Mrs. Cannon will be ably assisted by a committee of capable and enthusiastic women consisting of Mrs. E. J. Albert, Mrs. J. d'A. Clark, Mrs. H. S. Cshwalbe, Mrs. F. E. Winslow, Mrs. W. M. Shoemaker, Mrs. W. R. Maull, Mrs. B. M. Thomas, Mrs. G. E. Landt, Mrs. J. C. Schmidt, Mrs. J. C. Harper, Jr., and Miss Lois Hans.

A meeting of this splendid committee was recently held in the Onyx Room of the John Wanamaker Store, Philadelphia. The program is to be planned in such a way as to provide for proper relaxation as well as the other activities that permit the usage of surplus energy. Included in the program and on the day preceding the Atlantic City meeting provision will be made to view the historic shrines of Phila-



A few lengths or a hundred—it makes no difference. Just wire or mail your specifications to Armco, and you'll get Armco Spiral Welded Pipe when and *how* you want it. The *how* is just as important as the when; and you'll see what we mean when Armco Spiral Welded Pipe is set down on your receiving platform . . . pipe that is trim, strong, and free from surplus weight . . . pipe that is straight as a gun barrel, amazingly true round, and smooth inside for high-flow capacity. And with this time-saving, money-saving pipe, you can get any type of special fitting and connection you need. Also long lengths and the right coating for the job. What are your present needs? The American Rolling Mill Company, *Pipe Sales Division* • Middletown, Ohio

ARMCO

ARMCO
SPIRAL WELDED PIPE

GEORGE F. HARDY

Consulting Engineer

305-309 Broadway, New York City, N. Y.

Member—Am. Soc. C. E.—Am. Soc. M. E.—Eng. Inst. Can.

Consultation	Paper and Pulp Mills
Reports	Hydro-Electric and
Valuations	Steam Power Plants
Estimates	Plans and Specifications

HARDY S. FERGUSON & COMPANY

CONSULTING ENGINEERS

200 FIFTH AVENUE NEW YORK CITY

Hardy S. Ferguson—*Member A.S.C.E. A.S.M.E. E.I.C.*
Moses H. Teaze—*Member A.S.C.E. A.S.M.E. E.I.C.*
J. Wallace Tower—*Member A.S.C.E. A.S.M.E.*

Consultation, reports, valuations, and complete designs and engineering supervision for the construction and equipment of { PULP AND PAPER MILLS AND OTHER INDUSTRIAL PLANTS; STEAM AND HYDRO-ELECTRIC POWER PLANTS; DAMS AND OTHER HYDRAULIC STRUCTURES

HALF AGAIN

as much shower-pipe velocity

—No increase in pressure

In a Rainstorm, two small streams impinge at a predetermined angle—give a flat spray with nearly 50% increased velocity. Here's a cost-saving you can use. Write S & W for bulletin.

The SMITH & WINCHESTER MFG. Co.
SOUTH WINDHAM, CONNECTICUT 200

CHEMIPULP PROCESS, INC.

CHEMICAL PULP MILL ENGINEERS

CHEMICAL PULPING PROCESSES, OPERATING SURVEYS APPRAISALS ESTIMATES

WOOLWORTH BUILDING
WATERTOWN, N. Y.

CANADIAN AGENCY: 319 CASTLE BUILDING, MONTREAL, P. Q.
PACIFIC COAST OFFICE: 3311 FIRST AVE., SOUTH, SEATTLE, WASH.

VEST POCKET POWER PLANTS

Small space occupied, any capacity, low over-all operating costs, high and extreme efficiencies, reliability, low initial investment.
Complete power plants to meet any operating conditions of Pulp and Paper mills or other Industrial service. Engineering and Construction.
Satisfactory Services Always Guaranteed.

FERGUSON ENGINEERS
Power Specialists
Monadnock Bldg., Chicago

DRY PAPER EVENLY

STICKLE AUTOMATIC STEAM CONTROLS
DRAINAGE SYSTEMS FOR DRYERS AND HEATING SYSTEMS
CONDENSATION ECONOMIZERS FOR HEATING AIR
DEAERATING FEED WATER HEATERS, REDUCING VALVES
STEAM TRAPS, OIL AND STEAM SEPARATORS

STICKLE STEAM SPECIALTIES COMPANY, 2217 VALLEY AVENUE, INDIANAPOLIS, IND.

THE TRADE-MARK OF GOOD FELTS

The Waterbury Felt Co.
SKANEATELES FALLS, N. Y.

PULP MILL MACH'Y ◆ FINISHING ROOM MACH'Y
◆ FRICTION CLUTCHES ◆

Pulp and Paper Mill Screens

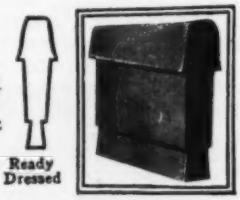
of STAINLESS STEEL—COPPER—BRONZE—MONEL—CHEMICAL RESISTING ALLOYS
Perforations that are accurate in size and alignment
ANY METAL •• ANY PERFORATION

The Harrington & King PERFORATING Co.
5654 Fillmore St., Chicago, Ill. ◆ 114 Liberty St., New York, N.Y.

"READY DRESSED" MILL COGS

LABOR SAVING—TIME SAVING

THE MOST ECONOMICAL FILLINGTHAT CAN BE PUT IN A MORTISE WHEEL



Ready Dressed

Blank Head

WE MAKE ANY STYLE OR SIZE WANTED

WRITE FOR INSTRUCTION SHEET "O" WHICH IS FREE

QUICK SERVICE ON ALL SIZES

THE N. P. BOWSHER CO., So. Bend, Ind.

delphia and vicinity. At Atlantic City there will be bathing in the surf and in the famous Ambassador pool, fishing, golf, bridge, and visits to the outstanding attractions.

Since the seashore and the ocean are important attractions, hotel reservations should be made at the Ambassador as soon as possible. The choice room locations will be made in the order of reservation. The rates for single rooms are $3 to $5 and for double rooms $5 and up. The number of minimum rate rooms is limited and should be reserved early.

◆ Visitors to Be Entertained at Franklin Institute

Visitors to the Fall Meeting of the Technical Association of the Pulp and Paper Industry, September 18-21, 1935, in Philadelphia, should make it a point to inspect the papermaking exhibit at the Benjamin Franklin Memorial Museum.

Ever since its beginnings, Philadelphia has been connected with the paper trade. Eight years after its foundation, in 1690, William Rittenhouse set up the first paper mill in America, on what came to be known as "Paper Mill Run," a creek emptying into the Wissahickon. The "Wissahickon Paper" became celebrated throughout the country for its whiteness and firm qualities. Towards the middle of the 18th century a rival mill was set up by Samuel Pond. Its product also was of the highest quality. Yet this mill never could successfully compete with the securely established Rittenhouse one. It often changed hands. Since 1850 it was known as the Megaree Paper Mill, and finally in 1884 it was torn down.

Owing to this early interest in papermaking as well as to the fact that Benjamin Franklin of Philadelphia was the most famous printer, author, and publisher of Colonial times, it is very fitting for a Philadelphia museum to pay especial attention to the paper trade.

In its Graphic Arts section the museum exhibits a Colonial print shop for the furnishing of which many authentic relics have been assembled. There is an old printing press which actually belonged to Franklin's printing company from 1780 onward. The exhibit contains another aged press, a wooden printing press imported from Germany by the Ephrata Society in 1745. It is practically certain that Franklin himself worked on this press, more than once, for he was in close touch with the mystical brotherhood and with a younger Rittenhouse, often visited at its cloister, the "Lager der Einsamen" (encampment of the solitary ones) on the Cocalico River, Lancaster Township. On this same press was printed, in five languages, the Declaration of Independence from translations made by one of the learned members. This press is now the property of the Pennsylvania Historical Society, which kindly placed it here on loan.

The whole process of printing in Colonial times is made clear in this display. Here one can see the vat and mould of the first handmade papers, the type cabinet and type trimming table (which Franklin brought from France in 1784 for his grandson whom he set up in the type founding business), an ink stone long used by Franklin, a small wooden press he used in bookbinding, as well as a number of printed sheets bearing his mark.

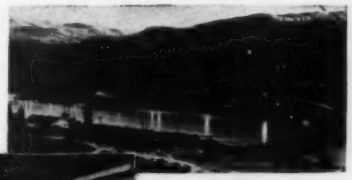
In contrast, there is a modern section, demonstrating how this same work of papermaking, printing, and even hand binding is done with the help of modern equipment. The only scale model of a fourdrinier papermaking machine ever built is shown here. It will make paper 8½ inches wide in rolls. Typesetting machines can be seen actually working. Presses, from the earliest commercially successful job press to the multicolored magazine press of today, are in operation. Different forms of printing, from woodcuts, copper or steel etchings, steel engravings, lithographic stone, are on view as well as blocks, plates, proofs, prints, and every kind of tool used in the process.

The whole history of papermaking and usage in the United States is shown in detail. Paper products, methods of paper testing (both mechanical and microscopical), pulps of different origin, papers for different uses—everything is shown. It is an exhibition which nobody connected with the paper industry or interested in it, can afford to miss.

The visit to the Franklin Institute will be made on Wednesday, September 18.

ANOTHER DEMONSTRATION . . .

at GRAND COULEE DAM



on the biggest excavation job ever undertaken by conveyors . . .

More than 50 WORTHINGTON

MULTI-V-DRIVES

with GOODYEAR EMERALD CORD BELTS

totaling over 7000 horsepower

are driving the giant Jeffrey Conveyors and other Jeffrey Equipment

. . . one more demonstration of the advantages of Multi-V-Drives in heavy duty service, where maximum power is required.

From fractional horsepower ratings up, there is a Worthington Multi-V-Drive for every power and purpose

¼ hp. typical unit

- Positive Grip
- Permanently Quiet
- Ideal For Close Centers
- Full Efficiency Maintained
- Negligible Maintenance Costs
- Full Performance In Any Position

25,000 stock combinations and unlimited specials

Every drive correctly rated

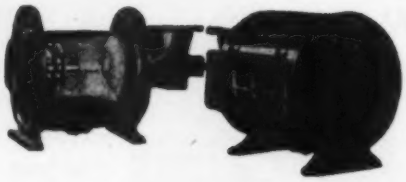
●

WORTHINGTON PUMP AND MACHINERY CORPORATION

A-3578 General Offices: HARRISON, NEW JERSEY

WORTHINGTON

Board Stock Improved by Preliminary Screening



Screening your board stock between the breaker beater and Jordan in Trimbey centrifugal screens will remove unbeaten flakes and return them to the beater for further treatment. A better and smoother board is thus made with a reduction in Jordan power. Simply write or wire for more information about Trimbey centrifugal screens for this service. It will be furnished without obligation.

TRIMBEY MACHINE WORKS
Glens Falls, New York

Other Products—Pulp knotters, consistency regulators, weight regulators and metering systems

The *original* motor driven bursting strength
TESTER
Quick, smooth and quiet action.
The preference for modern design and correct results.

E. J. CADY & COMPANY
549 W. Washington Boulevard, Chicago, Ill.

The Original LONGCRIMP FOURDRINIER WIRES

Were made by this Company in 1922. Their outstanding service is known from coast to coast.

Our Modified Longcrimp is the latest improvement in that type of wires. It has the extra life of the original Longcrimp and can be used for light weight paper.

The Lindsay Wire Weaving Co.
14025 Aspinwall Avenue Cleveland, Ohio

ENGLISH ECCO CLAYS TRADE MARK **CLAYS**

UNIFORM • SUPERIOR • DEPENDABLE

English China Clays Sales Corporation
551 Fifth Avenue, New York City

The Paper Industry Safety Contest

July 1, 1934 to June 30, 1935

Cum. Scores as of June 30, 1935

PERFECT SCORES

Division I—Paper and Pulp Mills

PARTICIPANT	MILL	LOCATION
GROUP A		
GROUP B		
St. Croix Paper Co.	Woodland	Maine
GROUP C		
GROUP D		
Bird & Son, Inc.	Phillipsdale	Rhode Island
U. S. Envelope Co.	Morgan Paper Co. Div.	Lititz, Pa.
International Paper Co.	Livermore	Chisholm, Maine
Spaulding Fibre Co., Inc.	New Mill Plant	Milton, N. H.
International Paper Co.	Riley	Maine
Mead Paperboard Co.	Rockport	Indiana

Division II—Remanufacturing

Container Corp. of America	Natick	Massachusetts
Texas Corrugated Box Co.	Dallas	Texas
Southern Container Co.	Houston	Texas
U. S. Gypsum Co.	Genoa	Ohio
Bemis Bros. Bag Co.	East Pepperell	Massachusetts

IMPERFECT SCORES

	Key Number	Rank	Disabling Injuries	Frequency Rate
GROUP A	P-108	1	11	4.491
	P- 30	2	9	6.034
	P- 18	3	13	6.597
	P- 64	4	12	7.199
	P- 62	5	15	7.581
	P- 27	6	22	8.059
	P- 23	7	11	8.722
	P- 31	8	15	9.229
	P- 67	9	21	9.451
	P- 13	10	17	9.590
	P- 12	11	13	10.210
	P- 09	12	17	10.321
	P- 10	13	13	10.571
	P- 44	14	17	11.317
	P- 19	15	16	11.386
	P-114	16	19	12.667
	P- 1	17	29	13.008
	P- 95	18	17	13.196
	P-101	19	18	13.619
	P-102	20	36	17.887
	P- 78	21	28	20.045
	P- 28	22	88	20.453
	P- 2	23	30	21.830
	P- 87	24	42	24.278
	P- 73	25	39	29.140
	P- 74	26	71	44.515
	P- 71	27	68	51.030
GROUP B	P- 21	2	7	7.016
	P- 68	3	7	7.367
	P- 25	4	8	9.094
	P- 11	5	8	10.282
	P- 70	6	10	10.406
	P- 3	7	8	10.929
	P-112	8	12	13.543
	P- 60	9	14	14.471
	P- 22	10	13	14.792
	P- 40	11	18	16.407
	P- 51	12	13	17.409
	P- 26	13	21	21.355
	P- 82	14	20	22.785
	P- 45	15	22	22.875
	P- 76	16	17	23.232
	P- 16	17	19	25.201
	P- 32	18	24	25.510
	P- 77	19	29	38.527
	P-104	20	30	41.302

	Key Number	Rank	Disabling Injuries	Frequency Rate
GROUP C	P-100	1	1	1.823
	P- 52	2	1	2.089
	P- 55	3	2	3.267
	P- 72	4	2	3.303
	P- 61	5	6	11.876
	P- 17	6	5	12.118
	P- 56	7	9	13.277
	P- 89	8	7	16.567
	P- 46	9	12	16.861
	P- 43	10	9	20.705
	P- 88	11	12	21.874
	P- 33	12	11	22.796
	P- 4	13	11	23.537
	P- 75	14	11	23.714
	P- 41	15	11	23.780
	P- 49	16	10	25.031
	P- 59	17	16	25.860
	P- 79	18	18	27.969
	P- 29	19	14	28.262
	P- 48	20	15	28.804
	P- 14	21	13	35.529
	P-113	22	20	45.540
	P- 47	23	28	56.485
	P- 50	24	27	73.494
GROUP D	P- 63	7	1	3.307
	P-109	8	1	4.449
	P- 6	9	2	5.794
	P- 94	10	2	6.951
	P- 97	11	3	8.769
	P-110	12	1	8.974
	P- 92	13	1	9.074
	P- 85	14	1	13.244
	P- 7	15	4	13.689
	P- 93	16	2	15.007
	P-103	17	5	16.373
	P-107	18	7	22.596
	P- 5	19	9	26.253
	P- 24	20	7	29.905
	P- 80	21	11	32.700
	P- 42	22	6	34.169
	P- 81	23	14	42.273
	P- 99	24	6	44.361
	P- 8	25	8	46.837
	P- 98	26	19	85.198
Division II				
	R- 3	6	1	4.973
	R-10	7	4	7.031
	R- 6	8	10	8.550
	R- 8	9	7	9.176
	R- 9	10	4	12.434
	R-16	11	4	12.906
	R- 2	12	9	14.073
	R- 1	13	11	26.038
	R-13	14	10	38.107

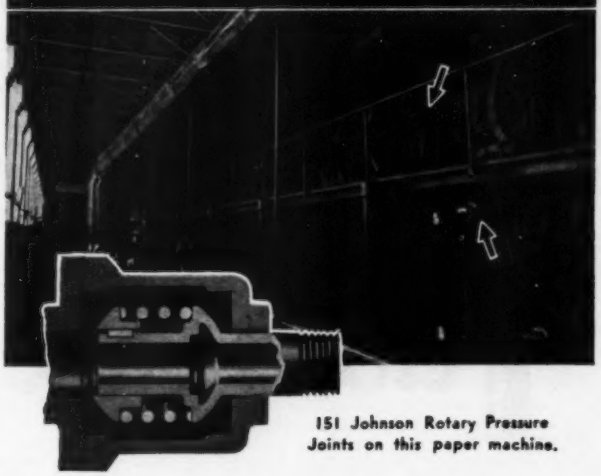
No June Report: P-16, P-72, P-103, R-16.
No May or June Report: P-114, R-5.
Withdrawn: P-83.

◆ Contest Winners Will Be Announced at Annual Safety Congress

The above scores are the closing scores in the twelve months 1934-1935 Safety Contest of the Pulp and Paper Section. However, these statistics are tentative and must not be construed as announcing the group winners nor as being final.

All records will be checked carefully by the National Safety Council before a final report is published. As there has not been sufficient time in which to audit the statistics since the last reports were received, the final report and announcement of winners will not be made until the 24th annual safety congress in Louisville, Ky., October 14-18.

"HOW can I escape those steam joint troubles?"



151 Johnson Rotary Pressure Joints on this paper machine.

Here's YOUR ANSWER—

Every time you have oiled, packed, adjusted or replaced a steam joint or "steam fit" on rotating equipment, you have probably wondered when some one, somewhere, would find a way to eliminate those time-and-money-wasting operations.

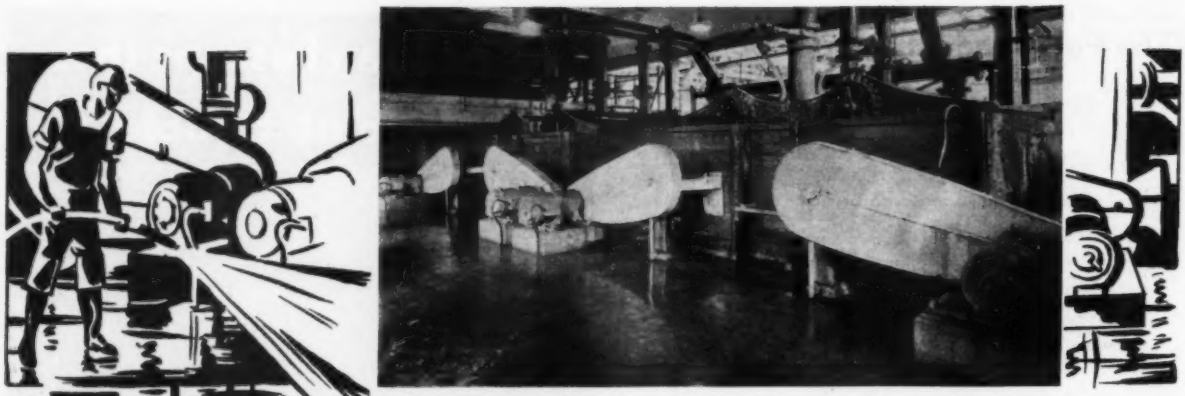
The answer came four years ago — the Johnson Rotary Pressure Joint — a stuffing box that is packless, self-oiling, self-adjusting. The illustration explains its simple, effective construction. Pressure is retained by the two spherical-end members which are held against a carbon-graphite bearing ring and a seal ring by the force of the pressure within the housing. By using the pressure-seal principle, the joint is self-adjusting to every pressure change. The carbon graphite rings are self-lubricating. The ball-and-socket effect compensates for all angular or lateral mis-alignment. That's why users report that there seems to be *no wear out* to the rings.

Test it—at our expense

We welcome tests of Johnson Joints. We will gladly supply a joint for test. If it fails to prove better than any other joint you have ever used return it transportation charges *collect*. Ask for new bulletin describing the Johnson Joint in detail.

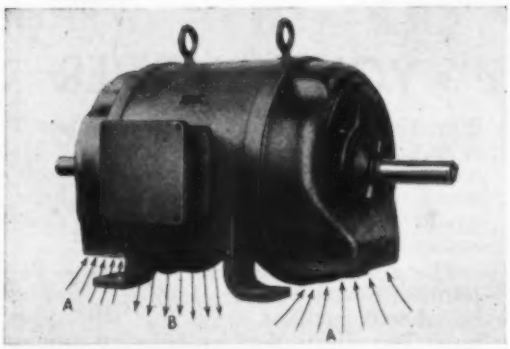
The JOHNSON CORPORATION
820 Wood Street Three Rivers, Michigan

Johnson
Rotary PRESSURE JOINT

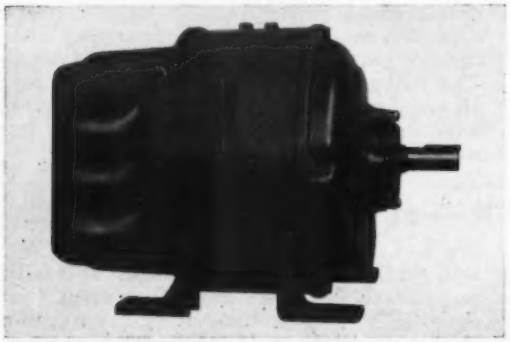


Reliance GearMotors with Splash-proof A-c Motor Units, driving pulp deckers, are constantly exposed to splashing liquids.

"I don't care if you do!"



Type "AA" Reliance Splash-proof Motor. Fans draw the air into the motor through intakes (A, A) in the end shields front and rear. It is circulated over the heads of the coils and stator core. It leaves through openings (B) at the bottom of the frame.



Reliance Type "T" D-c Splash-proof Motor.

TURN on your hose - - see if I care, might be the indifferent challenge of these Reliance Motors. Wherever motor life is threatened by the frequent washing of machinery, by leaking valves, by falling dirt and debris, Reliance Splash-proof Motors have established enviable records for continuous, trouble-free operation.

Tested design excludes all splashing liquids from the windings, which are further protected by thorough insulation. The motors develop the same ratings as their open counterparts and require no more floor space. The water-tight junction box prevents shorts and grounds where connections are made.

Does the water-and-other-liquid angle make it tough for motors in your plant? Put Reliance engineering and Reliance Splash-proof Motors on the job.

RELIANCE ELECTRIC & ENGINEERING CO.
1088 Ivanhoe Road Cleveland, Ohio

Branches: Birmingham, Boston, Buffalo, Chicago, Cincinnati, Detroit, New York, Philadelphia, Pittsburgh.

Representatives in other principal cities.

RELIANCE A-C D-C MOTORS

POWER

GENERATION + UTILIZATION + MAINTENANCE

This section turns the searchlight on power and its allied problems, showing big possibilities to save. Opportunities to improve conditions, methods, apparatus will be discovered. Worth while practices suggest new ideas and wider usages of equipment.

By W. S. JOULE

◆ Draft Gauges are Essential

Draft gauges on each boiler are indispensable; that is, no boiler should be installed, with either stoker-fired equipment or hand-fired equipment, without a draft gauge that will indicate not only the draft over the fire but the draft at the rear of the boiler or at the damper. Then again, when we say that draft gauges are indispensable, it should be understood that they are to be kept in proper operating condition, with the fluid in the gauges at all times, so that anybody passing through the boiler room and observing the boiler unit, will know the amount of draft at the damper and in the furnace.

Draft is one of the most important factors in connection with boiler room operation and the increasing tendency to operate boilers with high overloads has introduced another important factor in the draft problem. The higher rating often requires special arrangement for boiler baffling, introducing an element of uncertainty as to the draft losses at higher ratings, and unless ample provision is made to indicate draft losses economical operation cannot be obtained. Therefore, it is not only necessary to have a draft gauge to show the draft in the furnace, but there should also be a draft gauge connected with the rear of the boiler to show at all times the draft loss through the boiler.

◆ Cleaning Condenser Tubes

Formation of scale upon the tubes is a condition which seriously impairs the heat transmission and must not be overlooked during inspection. If much scale or mud is found to be present, steps should be taken to have it removed immediately.

The steam space should be inspected for grease and sludge which comes over with the exhaust steam and which accumulates on the tubes and shell. Such sludge is best removed by filling the steam space with a strong solution of soda ash and boiling out with steam. In doing this, suitable vents must, of course, be provided so as to prevent the building up of pressure.

All gauges and thermometers associated with the condensing equipment should be inspected and tested frequently so that there will be no possibility of their giving false indications.

Another important factor in connection with condenser operation is the keeping of tubes and tube sheets of the condensers clean, so as to insure a maximum heat transfer and a good flow of water through the tubes. From periodic readings, taken over frequent intervals, of temperatures of the cooling water at inlet and outlet, of vapor in the condenser and of the condensed steam, it is possible to determine quite accurately the degree of cleanliness in the condenser.

Careful records also make it possible to determine whether this trouble is the result of decreased conductivity due to the tubes becoming slimed up or coated with mud or scale, or whether the trouble is due to the tube sheet becoming plugged with leaves or other material which may find its way past the screens, thus diminishing the quantity of cooling water. Where this latter trouble is frequent, a gauge on the inlet connection of the condenser will often aid materially in determining the condition of the tube sheet by indicating an increased pressure and it is sometimes advisable to have piping installed with the proper arrangements so that the flow of water through the condenser can be reversed from time to time, thus permitting the water to wash away the material which has accumulated. The deposit which collects on the interior of the tube surface varies according to the cooling water from a hard scale, in a few cases, to a soft slime and the method of cleaning must be adapted to the substance which is to be removed.

◆ Reliability in the Boiler Room

In present day power plant design and operation reliability has become a most important consideration. Securing it in high degree where it is most essential has necessitated some rather rapid engineering development, particularly in plants in which the demands incidental to high load factor operation give no breathing spells for the quick repairs, adjustments, and cleanings which would otherwise serve to lengthen the active service periods and reliability of boilers and other apparatus. Such conditions are, however, not necessarily unmixed evils. They have forced the designer and manufacturer to meet these conditions of service by introducing rather larger factors of trouble prevention than have hitherto been considered necessary.

To meet the demand for reliability in service, what may seem excessive precautions have been taken to safeguard against every source of trouble that might result in even a momentary interruption of service. This has no reference to spare equipment. Beginning at the boiler end and running through the turbine, typical instances are as follows: (1) Special arrangement in the way of light and quickly-handled access doors for internal and external cleaning of tubes; (2) the development of baffles designed for long life and hard service; (3) accessibility for internal inspection and external cleaning of superheaters; (4) accessibility for maintenance and care of boiler and superheater joints; (5) strength, simplicity, accessibility in economizer design, placing it more on a parity with and tying it in closer to the boiler; and (6) greater consideration given to the mechanics of piping design.

◆ CRACKS OR FLAWS in a smooth metallic surface are rendered visible by thoroughly moistening the surface with kerosene and then rubbing and drying it with a clean cloth and subsequently rubbing over the surface with chalk. The location of flaws will then be revealed by traces of the kerosene coming out again from the cracks into the chalk surfacing.

◆ Application of Mechanical Coal Handling Methods

When used as a fuel for the generation of power, coal must be charged with the cost of handling from the time it is received at the plant until it is consumed in the furnaces. These charges will result from unloading the coal, transfer to bunkers or to storage, reclaiming from storage and distribution to the stokers.

Methods which may be employed for these operations vary greatly in first cost, operation costs and the cost of maintenance. The true engineering involved then is in the selection and arrangement of equipment such that the costs as stated above will be in proportion to the total plant expenditure, and such that the equipment when in operation will have a positive earning capacity. It must pay dividends the same as any other part of the plant equipment.

Coal handling equipment is not confined in use to central stations and the larger industrial plants. Labor supply and costs and coal market conditions are such that mechanical handling of coal is proving economical for the smaller plants. There is no reason to believe that these conditions will change materially in the future. The prospective purchaser for the small plant need not entertain any fear as to the loss of earning capacity by this equipment.

For Paper Makers The THWING PORTABLE pH METER

It is just like taking the laboratory into the mill when you have a Thwing Portable pH Meter. This instrument is a completely assembled unit all ready to take the pH readings. All you need do is, set the pH Meter on a bench near the beater, flow box or save-all, take a sample of the pulp and test it right on the job.

You don't have to filter the sample, simply test the pulp as is. Color does not interfere with a Thwing pH determination.

Using antimony electrodes, the Thwing Portable pH Meter follows the full range of changes in paper mill pH requirements.

Full range of the pH Meter is 0 to 12 pH. The readings are directly in pH units.

Technical knowledge is not required to use the Thwing Portable pH Meter. Any mill man can use this instrument successfully.

Write for Leaflet M-341

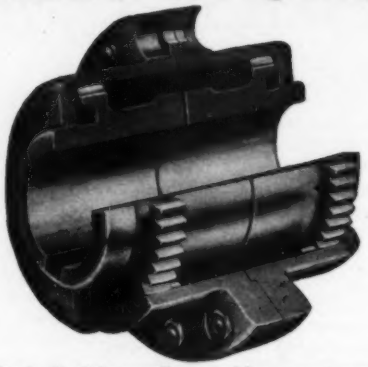
413

THWING
INSTRUMENT COMPANY

3353 Lancaster Ave. :: Philadelphia, U. S. A.

Attend TAPPI FALL MEETING Sept. 18-21
Philadelphia and Atlantic City

POOLE
Flexible Couplings

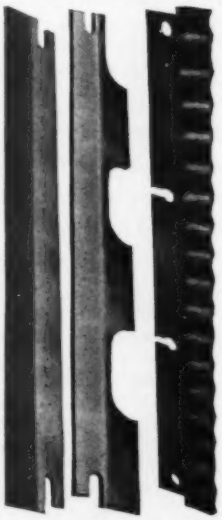


The Poole flexible coupling combines great mechanical strength with an unusual capacity for adapting itself to ordinary shaft misalignments. It has no springs—rubber—pins—bushings—die castings or any flexing materials that require frequent replacement.

Using strong specially treated steel forgings, long wearing gears in constant bath of oil, this coupling eliminates your coupling troubles.

Oil Tight—Dust Proof—Free End Float—Fully Lubricated
Send for a copy of our Flexible Coupling Handbook

Poole Foundry & Machine Co.
Baltimore, Maryland



SWW
Beater Bars

On the left—a standard straight bar for all ordinary beating requirements.

Center—a Dowd staggered bar; a design that will increase circulation, suction and break-up of stock; also reduce friction and lower the risk of burning.

Right—Simonds-Dayton corrugated design; stronger and particularly efficient because of the brushing action of the corrugations.

Also Simonds-Dayton vented type — not shown — and all standard patterns.

and Bed Plates

Complete line—the new abrasive-steel combination bed plate for use on long fiber stock of which kraft, wrapping, envelope and rag are typical. Brushes and draws the fibers.

Also diamond, open center, and all standard patterns.

Paper trimming knives, chipper knives, roll bar grinders, etc.

DAYTON GRINDING WHEELS

SIMONDS WORDEN WHITE CO.
OFFICE DAYTON, OHIO
SWW
Factories at DAYTON-BUFFALO-CLEVELAND-BELOIT
SWW

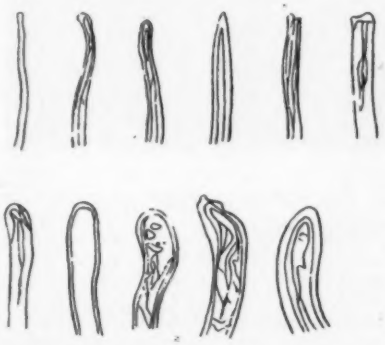
TECHNICAL DEVELOPMENTS

The following abstracts are of the latest developments found in the foreign press. Photostats and translations of complete articles can be obtained at cost price.

IN THE PAPER INDUSTRY

◆ Paper Miscroscopy at Berlin-Dahlem

The State Testing Bureau has issued a communication, which is divided into 4 sections: (1) the detection of amyloid formation in genuine parchment papers (which presents nothing new), (2) an attempted corroboration of the Shaffer method for the rapid differentiation of bleached sulphate and bleached sulphite pulps (Cf. Ind. Eng. Chem., Analytical Ed. 5, 35, [1933]), (3) the distinction between cotton linters and fibers from cotton rags in paper, and (4) the staining of mechanical and chemical pulps preparatory to miscroscopic determination (which has been previously described by Schulze, Papier-Fabr. 30, 65 [1932]). Only sections (2) and (3) are of special interest. Shaffer's method was not confirmed by the present investigator. A 1:1 mixture of bleached soda and bleached sulphite when treated with Grübler's brazilin and Na_2CO_3 solution showed no appreciable differences under a variety of conditions. (It appears however that only one brand of brazilin was used and that soda, not sulphate pulp was employed in the tests—Translator). According to Shaffer, bleached sulphate gives a purple color while bleached sulphite gives a wine red coloration. The present author finds that ordinarily the soda pulp gave a somewhat deeper violet shade than did the sulphite pulp, but that there was not enough difference to furnish a diagnostic test. The differentiation of linters and ordinary cotton fibers in paper is exceedingly difficult both morphologically and chemically. However, since linters are much



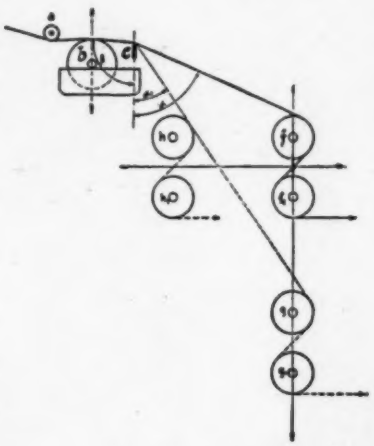
shorter, the author worked on the hypothesis that pulp containing them would show a far greater percentage of the natural fiber ends than could be found in cotton rag paper. In fact cotton rags showed practically no natural fiber ends. The illustration shows the various types of natural (linter) fiber ends found by the author (magnification X 335 diameters (?)). Thus paper produced from rags only could be definitely distinguished from paper containing linters. A real difficulty arose however in attempting to determine whether a rag paper contained both linters and rag. Quantitative estimations were hardly possible but the author found that the fluorescence microscope was of service. If a rag paper is defibrinated, and the pulp immersed for 3 minutes in 0.5 per cent Rhodamine 6 D extra, washed on a screen with conductivity water until the filtrates are colorless, and then treated with 5 per cent Na_2CO_3 solution, the linters show fluorescence colors which are usually bluish-violet, but sometimes greenish-yellow. The cotton rag fibers give much more brilliant colorations. The majority of these fibers are reddish violet, although individual fibers are red, blue, or even yellow. Bruno Schulze. Papier-Fabr. 33, No. 19, 165-167 (1935).

◆ Hydration of Various Types of Sulphate Pulps

Using an experimental Geijer beater which gives highly reproducible results, experimental and commercial sulphate pulps were submitted to hydration. A close correlation appears to exist between the hydration and the degree of pulping. The greater the delignification, the more readily is the pulp hydrated. The time of beating rises regularly with the lignin content. However, it is also contingent on the nature of the wood used. (The time required to reach a definite degree of hydration of 45 deg. S. R. for different pulps, all having the same Roe number of 7, may vary as much as 50 per cent. These differences become less marked as the Roe number decreases. Hydration curves for commercial pulps produced by direct cooking according to the authors' specifications are coincident with those obtained in indirect cooks. Hydration curves from pulps showing different degrees of pulping, but prepared from the same wood sample were very similar although there is a shift which renders such curves approximately parallel. This shift is explained by the fact that fibers show a tendency towards fibrillation only when the degree of beating of 25 deg. S. R. has been reached. The time required to reach a definite degree of beating however, varies in such cases. As the fibers are separated into fibrils the hydration curve rises rapidly. The cementing substances between the fibrillae are more or less resistant depending on the degree of pulping, and on the nature of the wood. The investigations were carried out using as raw materials wood bolts, and saw mill wastes, either undried or else dried in a Nordström drying tower. The original article has 11 illustrations. E. Hägglund and Jarl-Erik Ohlsson. Svensk Pappers-Tidn. 37, 719, (1934) through Papier-Fabrik. 33, No. 20 (Abstracts) 81-2 (1935).

◆ Device for Producing Coated Paper

The patent applies specially to carbon paper. After making contact with the coating drum (b), the sheet passes over the scraper (c), from which it may be

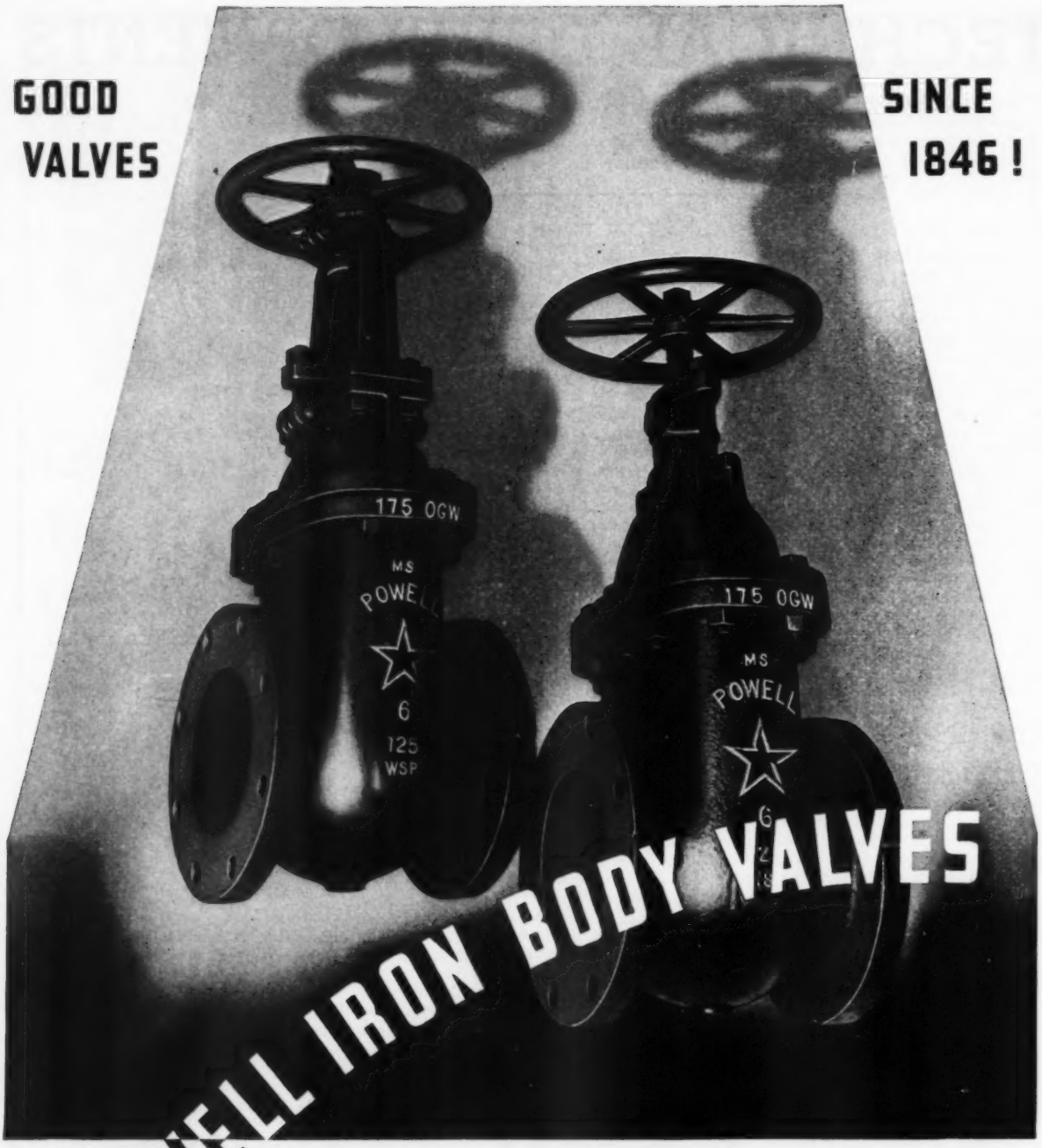


drawn off at any desired angle (alpha), depending on whether the rolls (f) and (f_1) are moved horizontally so that they occupy a position like (h), (h_1), or vertically, so that they occupy positions (g), (g_1). The same objective may be reached by keeping the rolls (f), (f_1) fixed, and by raising and lowering (b) and (c). Radebeuler Maschinenfabrik August Koebig G. m. b. H.; Radebeul in Sa. German Patent No. 608,999.

◆ Perviousness of Paper to Bacteria

This is a modification of the Rodenbeck method for testing a paper or a film for permeability or impermeability to bacteria [Cf. Central bl. Bakteriologie, 123, 1st part, p. 241 (1932)]. The report is made by the State Materials Testing Laboratories, at Berlin-Dahlem. Shallow metal drums are used and within each is placed a Petri dish containing sterile nutrient protein broth. The paper sample to be tested is stretched between rubber washers and it then acts as a seal for what is otherwise the open end of the drum. About 100 square centimeters of the sample are exposed, and its surface is within 2 cm. of the surface of

GOOD VALVES SINCE 1846!



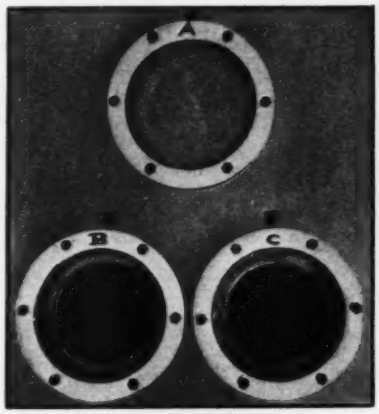
POWELL IRON BODY VALVES

NEW! Modern! Scientifically designed for present-day service demands. Precision in manufacturing processes . . constant improvement and inspection of materials . . assurance of dependable valve performance!

The Wm. Powell Co., 2525 Spring Grove Ave., Cincinnati, O.

POWELL VALVES

the nutrient broth. This outer paper surface is then evenly and carefully sprayed with a suspension of bacteria (Bacillus prodigiosus) so that the culture medium can only be reached by passage through the paper sample which is being tested. In the illustration, (A) shows the sample stretched over the drum prior to the test, (B) shows a Petri dish, the culture medium of which is free from colonies of bacteria. (C) shows a Petri dish within



which colonies of bacteria have grown. In the case of (B) the paper sample (removed in the photograph) was impervious, while in (C) the paper was evidently previous to bacteria. (While the author does not furnish data on the time required for the test it is assumed that 48 hours elapsed, as recorded by Rodenbeck—Translator). The dimensions of the pores of the paper determine the penetrability of the bacilli. In order to simulate practical conditions, a paper which was shown to be impervious in the above test was brought into direct contact with the culture medium, and then sprayed heavily with a B. prodigiosus suspension. Even under these conditions no bacteria developed in the Petri dish. Bruno Schulze; Wochbl. Papierfabr. 66, No. 18, 345-6 (1935).

◆ Requirements of Pulp in Viscose Production

This article, while it furnishes no new experimental data, gives a comprehensive résumé of recent work dealing with the nature of cellulosic raw materials, newer methods of delignification, and the properties which pulp must possess in order to fulfill the requirements of the viscose industry, as well as those of the nitrocellulose and cellulose acetate manufacturer. The dioxane delignification of Engel and Wedekind (German Patent No. 581,806) was recently shown to yfeld a pulp that is too low in alpha-cellulose content to warrant further purification. Dreyfus (French Patent No. 749,536) claims that by heating cellulosic raw materials with the higher boiling alcohols, a pulp suited to cellulose acetate production may be formed. Kleinert and Tayenthal's method, which involves delignification by the use of aqueous ethyl alcohol at 180 deg. C., (Cf. Papermaking Research around the World, THE PAPER INDUSTRY, September, 1932) apparently gives a wood pulp containing 80-90 per cent alpha cellulose. These are simply typical references in a bibliography giving 75 citations many of which are to the recent patent literature. D. Krüger. Die Zellstoff-faser, 32, No. 3, 33-38 (1935).

◆ Progress in Paper Testing During 1934

A brief resumé of the advances made, and the technic developed in the microscopic, chemical and physical testing of paper, and the chemical and physical testing of pulp. The 56 references include largely work done in Germany and the U. S. A., with very few references to articles published in France and Sweden. The compilation comes from the State Bureau of Testing Materials at Berlin-Dahlem. Prof. Dr. Korn; Woc; Wochbl. Papierfabr. 66, No. 16, 305-6; No. 17, 320-21 (1935).

◆ Reducing Valve

Here a steel diaphragm is used in place of the more common rubber ones. Its construction is shown in Fig 1. Two spiral coils of square section stainless steel welded at either end are so arranged that the interstices are not in

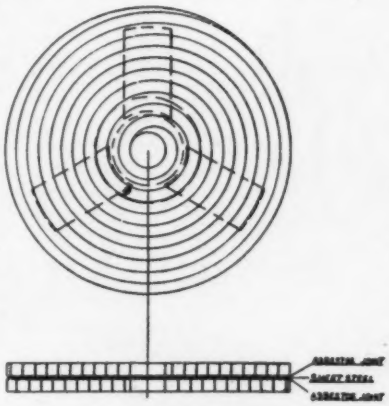


Figure 1

direct line with each other (Cf. Fig. 1). Between these coils there is a thin metallic sheet diaphragm, and chafing is prevented by sheet asbestos joints on either

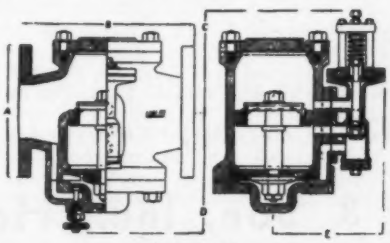
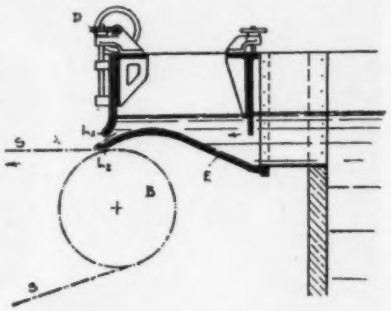


Figure 2

side. Fig. 2 shows the diaphragm fitted into the main and relay valves. Engineer, (T. S.) Paper-Maker and Brit. Paper Trade J. 89, No. 4, 52 (1935).

◆ Slice for Fourdrinier Paper Machines

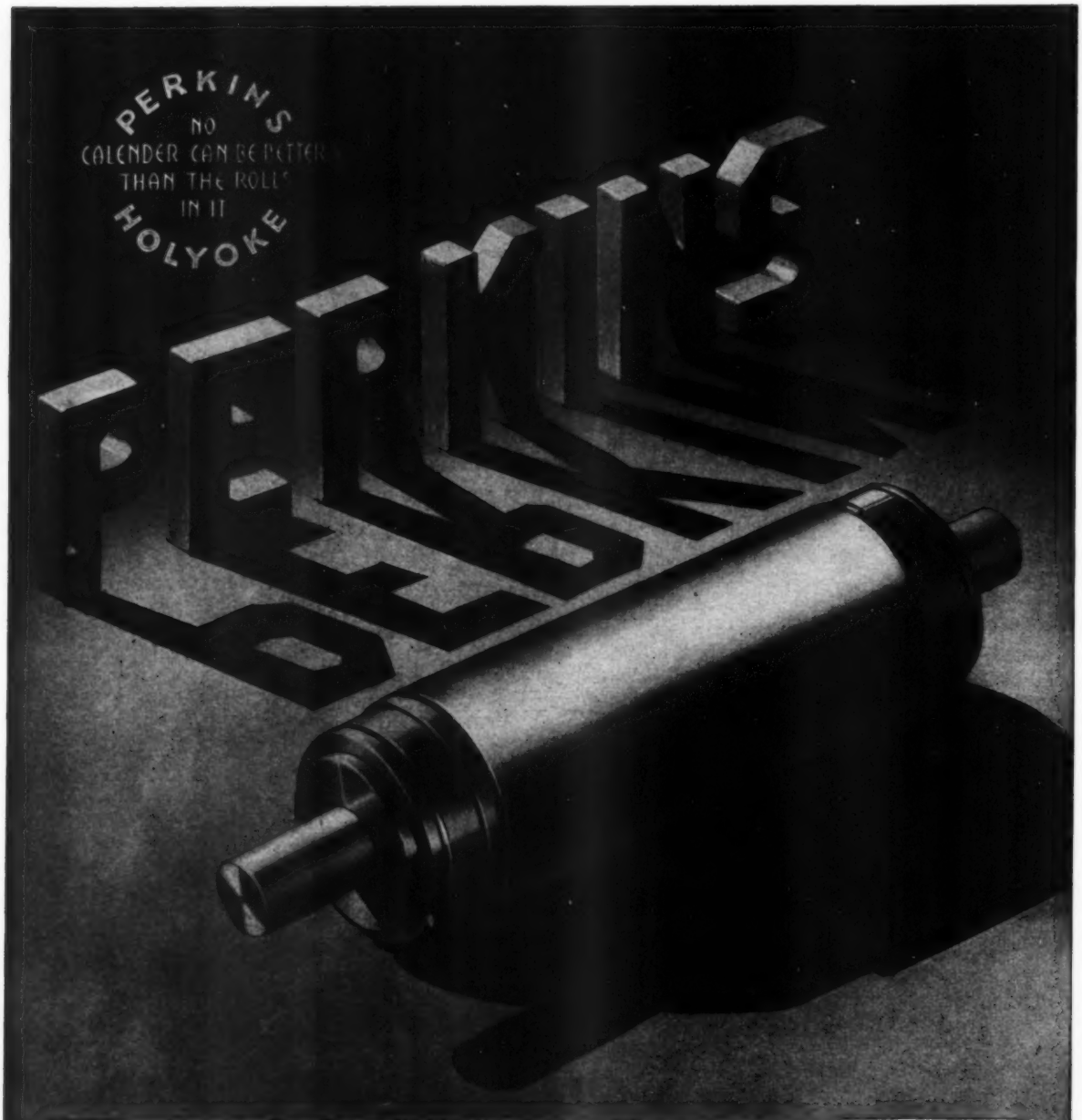
The stuff has its flow to the slice regulated by means of a baffle, which is adjusted by the use of spindles. It passes through a slot formed by the curved, tapering and protruding lower lip (L_2) and the upper lip (L_1) which is carefully constructed and which is controlled by spindles (D), the number of which depends on the width of the



sheet being formed. (L_2) may be either moveable or fixed. It has its outer end approximately 2-3 mm. above the wire (S) coming over the breast roll (B). The construction and shape of the bottom (E) influences the stuff flow towards the slot. The invention claims that by the discharge from this narrow slice, a uniform felting of fibers results automatically since a whirling motion is attained as the stuff contacts (S). Otto Schmidt. Oberleschen, Schlesien. German Patent No. 611,585, Kl. 55d.

◆ Errors in the Lignin Determination

Disturbing factors in determining lignin by the 72 per cent sulphuric acid method were investigated and their effects in various lignin procedures were carefully studied. Special attention was given to the effect of sugars and proteins. Fructose and xylose (the latter being a frequent component of hydrolysis products of wood and straw) give insoluble residues on standing with 72 per cent acid, and thus increase the apparent lignin figures. Polysaccharides give rise to pentose sugars and have a similar effect. The error in the determination increases with the time of contact with the acid. If this period does not exceed 2 hours, the effect is very slight. To obviate this, the hemicellulose may be removed by hydrolytic pretreatment with 5 per cent sulphuric for 1 hour, and the residue then submitted to the usual lignin determination. Whether this pretreatment is justified is still a question, since its effect on lignin is not known. In any event the lignin figures obtained in this way are always considerably lower than those obtained by the Ritter-Seborg-Mitchell (2 hour) procedure. The general statement may be made that lignin figures hitherto recorded in the literature are, in most cases, too high. The mechanism of the xylose disturbance, depends on the formation of furfural, which then



The superior finishing qualities of Perkins Calender Rolls are the natural result of the broadest experience in this highly specialized field of manufacture.

Perkins refills and remakes include the rolls of any manufacture, domestic or foreign, for any application in the paper industry.

B. F. Perkins & Son, Inc., Holyoke, Mass.
ENGINEERS AND MANUFACTURERS

gives an insoluble phenolfurfuran resin. Although proteins alone give no precipitate when treated with sulphuric acid, they do increase the apparent lignin figures when added to plant materials in which the lignin has been previously determined. This so-called lignin then contains nitrogen. If protein and xylose are treated together with 72 per cent acid precipitates are formed when the protein content is low. Increasing the protein content actually reduces the amount of the precipitate until finally none is formed. By comparing the effects of adding protein to untreated and also to hydrolyzed straw, it was possible to distinguish between the effect of protein alone, of pentose alone and of the interaction of protein and pentose. Larger additions of protein have a less disturbing effect than do small amounts. Probably the fission products of the proteins combine with lignin. However, the error cannot be reduced by decreasing the time of contact from 16 down to 2 hours, nor by using the Ritter-Seborg-Mitchell method. In a number of cases acid pretreatment is partially successful in reducing (but not in entirely eliminating) the error. Attempts to determine the nitrogen and then to calculate the residual protein in the lignin serve to introduce other errors which may be greater than those that they strive to correct. Arthur Geoffrey Norman and Samuel Harry Jenkins. Biochemical J. 28, No. 6, 2147-2168 (1934).

◆ Thermotechnical Measuring Instruments

The descriptions which follow are of instruments first shown at the Spring Leipzic Technical Exhibition (1935). Figure 1 illustrates a filament pyrometer

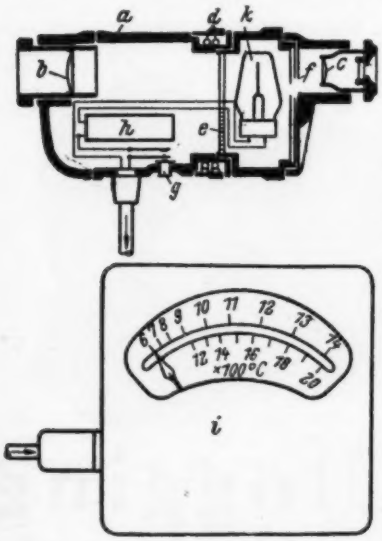


Figure 1

(Siemens and Halske), the housing of which is shown by (a). The observer is able to regulate the brightness of vision to suit his eye and to gain precision in adjusting the instrument. This is made possible by the insertion of the adjustable neutral glass (f) between eyepiece (c) and the filament lamp (k). The two measuring ranges of the instrument are 600-1400 deg. C. and 1200-2000 deg. C. Colored markings on (c)

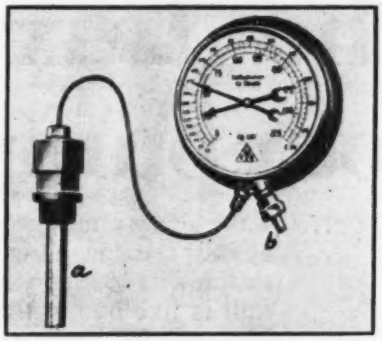


Figure 2

indicate which measuring range is being used. The other parts of the pyrometer are the objective (b), the rheostat (d), the smoked glass (e), push-button (g), flash-light-battery (h), and the recording instrument (i). The rheostat (d) for varying the brightness of (k) is simple and dependable. The advantages of the pyrometer lie in the brief time required for its accurate adjustment and in the reduction of the

Figure 3

current. The other new instruments described are a precision pressure gauge (de Bruyn), an indicator showing steam condition (Schäffer and Budenberg) a smoke density meter (Siemens and Halske), an orifice-type flowmeter (de Bruyn), and a novel, oval-gear flowmeter (Bopp and Reuther). No attempt is made to give the principle of all of these instruments which are fully described and illustrated in the original. The indicator showing steam condition is illustrated in Figure 2. It is useful where a uniform temperature must be maintained by the use of saturated steam of a given pressure, and where superheating is to be avoided. Here the dial of the gauge has a combination scale showing steam pressure [with connection at (b)] and of the equivalent saturation temperatures. When the steam is saturated the two pointers of the gauge will coincide. When the steam becomes superheated the pointers diverge. To insure agreement between the temperature and the pressure at all saturated steam pressures, a tension thermometer (a) is used in the vessel in which the steam is employed. A liquid (the nature of which is not described) evaporates in the immersion tube of this thermometer and the rise in pressure is identical with that of the saturated steam as long as there is no superheated steam. However, when the temperature in the vessel rises, due to superheating, the tension thermometer records the fact. More liquid evaporates, and the temperature pointer on the gauge no longer coincides with that recording the steam pressure. Figure 3 shows the working principle of the oval gear flowmeter for small liquid volumes. Two meshing eliptical gears (1) and (2) revolve on two stationary shafts. The flow of the liquid remains practically undisturbed, pressure losses and loss by leakage are low, and accuracy in measurement is claimed. The author also discusses briefly recent quantitative heat measuring devices (especially that of O. Wagner). Kurt Höhner Paper-Maker and Brit. Paper Trade J. (T.S.) 89, No. 6, 84-7 (1935). (Cf. also Engineering Progress in which the original article appeared.)

◆ Copper Numbers in Pulps

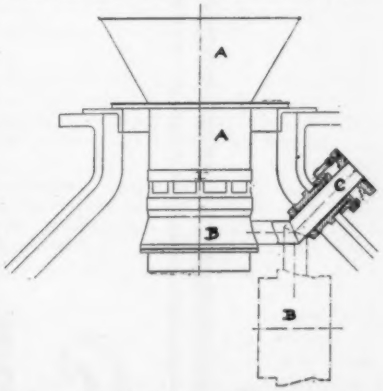
Detailed directions are given for determining the copper number by the Schwalbe-Hägglund method (Cf. Cellulosechem. 11, 1-4 [1930]) which will serve as standard for the Verein der Zellstoff -und Papier -Chemiker und Ingenieure. This is the 8th report of their Faserstoff Analysenkommission. Anon. Papier-Fabr. 33, No. 1 (T.S.) 1, (1935).

◆ Progress in Sizing During 1929-1934

A very complete review of the recent literature with 118 references. Ernst Hochberger. Papier-Fabr. 33, No. 7 (T.S.) 49-60 (1935).

◆ Chip Packer

The illustration shows a recent modification of the Svensson chip-packer. In this model, only the sheet-metal funnel (A) which receives the chips from the bin, is removable. The steam-fed device (B) which is directly connected with the steam inlet (C) is an integral



part of the digester and is never removed. However, (B) may be swung down at right angles to its usual position as shown in the figure, if the digester is to be inspected or if machine parts are to be introduced. Under these conditions the full area of the digester opening becomes available. Anonymous. Papier-Fabr. 33, No. 18 (T.S.) 158-9 (1935).

Take the "Luxury Tax" off your pumping costs

Take a few minutes off, right now, and look at your records. How much have stock-pump shutdowns cost you in the past year? If your mill is like many, the cost is pretty high—it's really a "luxury tax"—an unnecessary, undesirable, easily avoided charge against profits!

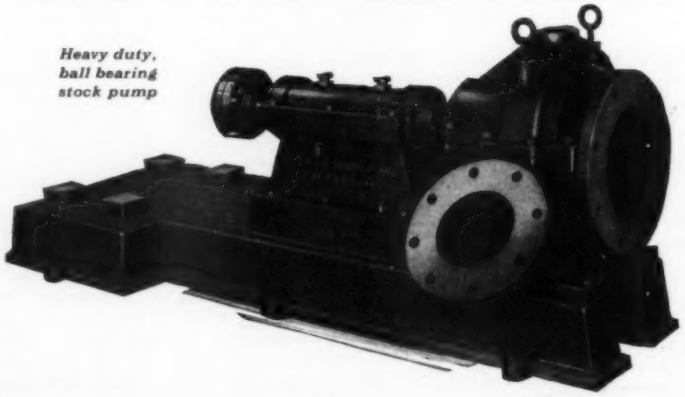
Buffalo Non-Clogging Paper Stock Pumps will reduce your shutdown costs to practically nothing. Due to the design of these pumps, close-running clearances are entirely unnecessary, hence there is no wear on shell or internal parts.

The pumps will handle foreign material in suspension without wear, reduction of capacity or efficiency—and will do so without clogging.

If you want lower pumping costs, let a Buffalo engineer give you our full story.

BUFFALO PUMPS, Inc.
213 Mortimer Street, Buffalo, New York
In Canada: CANADA PUMPS, Ltd., Kitchener, Ontario

Heavy duty, ball bearing stock pump



Don't forget
TAPPI FALL MEETING
Philadelphia - Atlantic City
September 18-21

"Buffalo" Non-Clogging Paper Stock PUMPS

PAPERMAKING PATENTS

IN THE UNITED STATES

Inquiries with reference to any of these patents should be addressed to James Atkins, Munsey Building, Washington, D. C.

Compiled by James Atkins, Registered Patent Attorney

19,643—Copperized Paper. William R. Barber, Albert G. Natwick, and Maurice W. Phelps, Camas, Wash., assignors to Crown Willamette Paper Company, San Francisco, Calif., a corporation of Delaware. Original No. 1,947,452, dated February 20, 1934, Serial No. 636,031, October 3, 1932. Application for reissue August 15, 1934. Serial No. 740,022. 3 Claims. (Cl. 92—21). The process of incorporating copper resinate in the fiber of a paper sheet, comprising the addition of copper sulfate solution in the beater furnish including regular rosin size from which the sheet is made, the rosin size and copper sulfate being relatively proportioned to effect the precipitation of a definite amount of copper resinate in and on the fiber, and maintaining a slight excess of size, whereby such copper as may come through in the back water during the process will be in the form of a non-corrosive, colloidal copper compound.

2,005,397—Manufacture of Strengthened Absorptive Paper. Milton O. Schur, Berlin, N. H., assignor to Brown Company, Berlin, N. H., a corporation of Maine. No drawing. Continuation of application Serial No. 554,598, August 1, 1931. This application January 21, 1933. Serial No. 652,939. 4 Claims. (Cl. 91—68). As an article of manufacture intended especially for such use as toweling, a dry paper web containing distributed therethrough about ¾% of regenerated cellulose, said web also containing distributed therethrough a smaller amount of solid wetting-out agent of sufficiently high wetting-out effectiveness to render said web capable of imbibing water practically instantaneously.

2,005,492—Apparatus for Conveying Envelope Blanks. Peter Becker, Dusseldorf/Wersten, Germany, assignor to United States Envelope Company, Springfield, Mass., a corporation of Maine. Application July 24, 1931. Serial No. 552,969. In Germany July 24, 1930. 3 Claims. (Cl. 198—31). A conveyor and separator for envelopes and the like, comprising a horizontal conveyor for transporting varnished wet envelopes, a plurality of other horizontal conveyors situated side by side with respect to each other, one of the second-mentioned horizontal conveyors forming a continuation of the first-mentioned conveyor, a driving shaft, a gripper situated over the second-mentioned horizontal conveyors, means actuated by said driving shaft for moving said gripper, said gripper transporting some of said envelopes from one of the second-mentioned horizontal conveyors to another one of the second-mentioned horizontal conveyors, and vertical conveyors forming a continuation of the second-mentioned horizontal conveyors.

2,005,678—Esterification of Cellulose. George Jayme, Hawkesbury, Ontario, Canada, assignor to Canadian International Paper Company, Hawkesbury, Ontario, Canada. No drawing. Application September 4, 1931. Serial No. 561,307. In Canada June 30, 1931. 2 Claims. (Cl. 260—101). A process of acetylating wood pulp, which comprises subjecting 100 parts of the pulp to treatment with 250 to 500 parts by weight of acetic acid containing 5 to 20 parts by weight of sulphuric acid for a period of 1 to 20 days at a temperature up to 60° C., washing the pulp with acetic acid to free the fibres from dissolved impurities and treating the pulp with acetylating reagents to form substantially pure cellulose acetate.

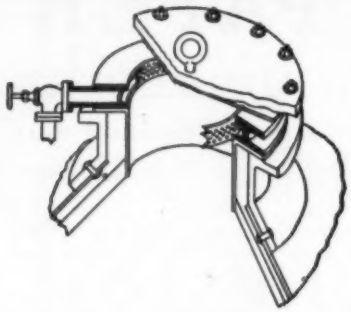
2,005,831—Pouring Carton. James Shaw, Akron, Ohio, assignor to The Colonial Salt Company, Akron, Ohio, a corporation of Ohio. Application April 9, 1934. Serial No. 719,639. 4 Claims. (Cl. 221—11). In a folding carton having an end wall comprising an inner flap, an intermediate flap and an outer flap secured together in overlapping arrangement, said inner flap having an opening with two pairs of cuts extending therefrom and forming two opposed tongues, a spout member having side walls, extending through said cuts, and a wall which is attached to one of said tongues whereby the tongue functions as a hinge connection between the spout member and said inner flap, the last mentioned wall acting as a cover for said opening when the spout member is in its closed position, said intermediate flap being provided with an opening through which the spout member is adapted to be moved to and from its closed position, and said outer flap being provided with a tear-out portion overlying and normally concealing the spout member but which upon removal forms an opening in the outer flap through which the spout member is accessible.

2,005,929—Paper Making Apparatus and Process. Earl E. Berry, Beloit, Wis., assignor to Beloit Iron Works, Beloit, Wis., a corporation of Wisconsin. Application August 18, 1932. Serial No. 629,265. 4 Claims. (Cl. 92—38). In combination with a paper making machine of the Fourdrinier type including the usual forming wire and partially formed paper web thereon trained around the couch roll, a suction roll contacting the web on the lower run of the wire, a pickup felt for receiving the web from the forming wire as it passes over the suction roll, means for directing said pickup felt over the suction area of the suction roll so that said felt is subjected to suction before contacting the web, an upper roll, located within the loop of the forming wire cooperating with the suction roll to aid in the transferring of the web to the pickup felt means for directing said web and pickup felt to the drying section of the paper machine, a drying cylinder, and a suction roll cooperating therewith for transferring the web from the felt to said drying cylinder. In the process of transferring a paper web from the forming wire of a paper machine to a pickup felt, the step of first subjecting the pickup felt to suction to dry the felt and then bringing said felt into contact with the paper web without interrupting the suction.

2,005,979—Drier Felt for Paper Making Machines. Tom Milnes, Lachute Mills, Quebec, Canada, assignor of one-half to Ayers Limited, Lachute Mills, Quebec, Canada. Application July 14, 1934. Serial No. 735,160. 4 Claims. (Cl. 24—33). A drier felt having end portions turned back and fastened to the body of the felt to provide integral tubular terminals, each of said terminals being slotted to provide a series of loops fitted between the loops of the remaining terminal and a pair of retaining keys passing through said loops and serving to hold them in their interfitting relation, said keys comprising two relatively thin and wide flat strips of metal flatly engaged with each other.

2,006,016—Method of Making Pigmented Paper. Alwin C. Eide and John Henry Calbeck, Columbus, Ohio, assignors to American Zinc, Lead & Smelting Company, St. Louis, Mo., a corporation of Maine. Application July 31, 1934. Serial No. 737,856. 25 Claims. (Cl. 92—21). In a process of making pigmented paper, the step of incorporating undried zinc sulfide in the paper pulp.

2,006,203—Carton and Liner for the Same. Harold Leslie, San Francisco, Calif., assignor to Fibreboard Products Inc., San Francisco, Calif., a corporation of Delaware. Application February 27, 1933. Serial No. 658,760. 6 Claims. (Cl. 229—14). A liner for a carton comprising a strip of fibrous material having a plurality of transverse creases, and folded to form wall sections and reinforcing columns having a uniform right angled triangular cross section, the perpendicular sides of the column lying snugly in the corners of the carton.



PROVED FACTS
about the
PANZL STRAINER

Non-Clogging: Note that the perforated section of the Panzl Strainer is vertical and rests on top of the neck of the digester. Small chance here for fibres to clog the strainer holes! But should this occur, the strainer may be cleaned without removal.

Easily Installed: The Panzl Strainer may be easily applied to your digester; no changes in the neck or cover being required; only longer through bolts.

Time Saving: When filling your digester it is unnecessary to disconnect the relief lines or remove the perforated strainer. This alone makes the Panzl Strainer a great operating economy, saving time and wear and tear on the connections.

Corrosion-Resistant: Made of Durco KA2SMo, acid resisting alloy steel with a carbon content of not over 0.07%. ***This low carbon alloy steel has never failed in hot sulphite liquor service.***

Durimet Optional: Durimet, a low carbon (0.07% max.) nickel-chromium steel is recommended where weak sulphuric acid is known to be present due to shut down periods or other causes.

AT YOUR SERVICE

For more complete information about the Panzl Strainer, relief valves, acid pumps and valves. digester fittings and other corrosion-resistant equipment for your mill, write

The DURIRON COMPANY, Inc.

Sole Licensees for the Manufacture and Sale of the Panzl Strainer in the U. S.

445 N. FINDLAY ST. DAYTON, OHIO

TAPPI Fall Meeting—Philadelphia - Atlantic City—Sept. 18-21

DURCO

KA2SMo

CARBON 0.07% MAXIMUM

$500.00 REWARD

It is illegal outside the Irish Free State to print Irish Hospitals' Sweepstake Tickets or Receipt Blanks, or to manufacture or use for printing, paper watermarked with the words

GENUINE SWIFT BROOK PAPER MADE IN IRISH FREE STATE

All copyrights respecting these printings and watermarked paper are vested only in certain firms in the Irish Free State.

The above-mentioned reward will be paid to the person supplying me or their local police with the first information leading to a successful prosecution for violation of these copyrights.

PHILIP O'REILLY, Solicitor
Bank Buildings
1 Upper Ormond Quay
Dublin
IRISH FREE STATE

[ONLY LETTERS CONCERNING THIS REWARD SHOULD BE SENT TO THE ABOVE ADDRESS]

2,006,208—Dull Finish Coated Paper. Donald B. Bradner, Oxford, Ohio, assignor to The Champion Coated Paper Company, Hamilton, Ohio, a corporation of Ohio. Application February 1, 1932. Serial No. 590,315. 10 Claims. (Cl. 91—68). Process of making dull finish coated paper which comprises applying an aqueous slurry containing uncooked starch to a paper stock, drying the coated paper, calendering and thereafter swelling the starch.

2,006,209—Dull Finish Coated Paper. Donald B. Bradner, Oxford, Ohio, assignor to The Champion Coated Paper Company, Hamilton, Ohio, a corporation of Ohio. Application May 25, 1933. Serial No. 672,906. 3 Claims. (Cl. 91—68). Process of making dull finish coated paper which comprises coating paper with an aqueous coating composition comprising pulverized cellulose, drying the coating, calendering the coating to the desired surface smoothness and thereafter moistening the coating.

2,006,229—Art of Coating Paper. Charles N. Cone and Earl D. Brown, Seattle, Wash., assignors by mesne assignments, to The Glidden Company, Cleveland, Ohio, a corporation of Ohio. Application March 5, 1930. Serial No. 433,520. 3 Claims. (Cl. 91—68). The process of making non-sticking coated paper, which comprises extracting a vegetable protein from seed material, digesting such protein several hours at raised temperature in a weakly alkaline solution to a form soluble in lime water even after being dried out, dissolving the protein in a weakly alkaline solution and incorporating with the solution a larger amount of a finely divided lime-containing filler than the protein to form a slurry, applying such slurry of lime-containing material and changed vegetable protein to the paper, and drying, whereby a water-resistant non-sticking paper sheet is attained.

2,006,445—Display Box. Bruce J. Davidson, Kew Gardens, N. Y., assignor to National Biscuit Company, New York, N. Y., a corporation of New Jersey. Application September 25, 1931. Serial No. 565,046. 7 Claims. (Cl. 206—44). In a display box, a box body having a bottom and four sides, a cover having a flat top and side and end flanges, each side flange being cut away intermediate its ends to provide a triangular section at one end and a trapezial section at the opposite end, the two sections being adjacent at the apex of the triangle and base of the trapezium, the angle between the adjacent sections being a right angle, the cover having a score line joining the apices of the triangles, said cover being foldable on said score line until the adjoining sides of the triangular and trapezial sections lie in a straight line thereby providing a right angled cradle for supporting the end and bottom of the box.

2,006,446—Means for Adjusting Container Bottoms. Bruce J. Davidson, Kew Gardens, N. Y., assignor to National Biscuit Company, New York, N. Y., a corporation of New Jersey. Application November 12, 1932. Serial No. 642,358. 16 Claims. (Cl. 206—44). In combination, a container having an adjustable bottom with side flaps extending upwardly therefrom, a cover frame fitting the top of the container and forming a cover opening therefor, side bars carried by said frame and spaced from the edges of the cover opening, said bars and flaps being arranged so that said flaps may be raised through said opening and hooked over said side bars to adjust the position of said bottom.

2,006,475—Carton. Joe O'Reilly, Tacoma, Wash. Application November 12, 1934. Serial No. 752,613. 7 Claims. (Cl. 229—52). A carton forming a compartment for a plurality of bottles, or the like, and having an elongated flap continuing from a wall thereof, adapted to be tucked between the overlapped and next adjacent bottle as a cushioning spacer therefor, and having an opening for receiving therethrough the neck portion of the bottle which it overlies.

2,006,499—Paper Metering, Cutting, and Reeling. Charles A. Fourness, Appleton, and Charles M. Pearson, Neenah, Wis., assignors to Paper Patents Company, Neenah, Wis., a corporation of Wisconsin. Application May 22, 1933. Serial No. 672,216. 9 Claims. (Cl. 242-56). In mechanism of the class described the combination of means for conveying a paper web, a pair of reeling devices adapted to alternately receive and reel the paper discharged from said conveying means, a pair of metering devices respectively associated with said reeling devices, and means connecting said metering devices for controlling the operation thereof in accordance with the reeling of the web on the respective reels.

2,006,530—Method of Sealing Card Board Boxes. Rudolf E. Zeruneith, West Collingswood, N. J. Application April 23, 1931. Serial No. 532,382. Renewed September 7, 1933. 2 Claims. (Cl. 93—42). The method of closing an open ended folding container having side walls, end tabs adapted to close the open end of said container and an end flap adapted to overlap said end tabs and to have the terminal thereof inserted between the edges of said tabs and the juxtaposed wall of said container, which consists in engaging said terminal in a slotted, flat anvil blade, inserting said anvil blade and said terminal between the edges of said tabs and the juxtaposed wall of said container so that said terminal lies against the underside of said juxtaposed wall, driving a stitch through said juxtaposed wall and said terminal and finally disengaging said terminal from said anvil blade.

2,006,548—Manufacture of Containers. William W. Halle, Newark, N. J., assignor to Seeley Tube & Box Company, Newark, N. J., a corporation of New Jersey. Original application February 5, 1930. Serial No. 425,951. Divided and this application July 6, 1932. Serial No. 621,000. 3 Claims. (Cl. 93—55). The method of making containers which consists in forming a tubular body out of plural layers of paper-stock with a non-glued interface between two of the layers, internally cutting off and removing a portion of the layers interior of such non-glued interface to form a rebate in the end of said body, applying an end wall to the rebate shoulder and crimping the rebate lip inwardly upon the margin of said end wall.

2,006,689—Container and Method of Making the Same. Henry T. Scott, Toledo, Ohio, assignor to The American Paper Bottle Company, Toledo, Ohio, a corporation of Ohio. Application August 29, 1933. Serial No. 687,381. 11 Claims. (Cl. 93—6). The method of fabricating a sealed container which comprises forming a container with a foldable end, immersing the container in a coating liquid which solidifies at ordinary temperatures, withdrawing the container and draining the same, and subjecting the foldable end to the action of a cooling medium to solidify the coating liquid covering this end more rapidly than the coating liquid upon other portions of the container.

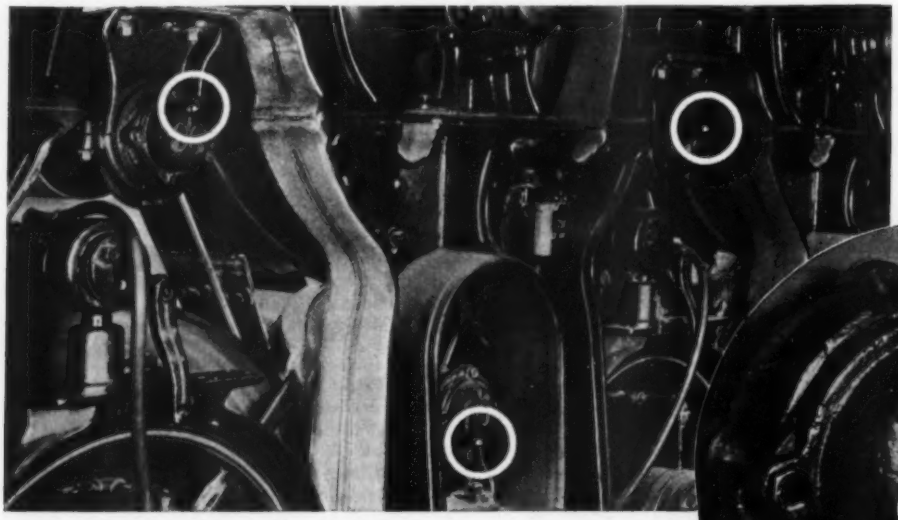
2,007,348—Process and Apparatus for Delignification. Walter G. Scharmann, Bassett Park, Mine Hill, N. J., and Fredrich Olsen, Alton, Ill., assignors, by direct and mesne assignments, to The Cellulose Research Corporation, a corporation of Delaware. Application October 23, 1929. Serial No. 401,749. Renewed January 23, 1934. 21 Claims. (Cl. 92—9). A process of delignifying wood comprising continuously passing wood in a moss-like condition in which the fibers have been substantially separated from each other, or reduced to relatively small bundles in which the individual fibers remain substantially unbroken, through closed digesters in one direction and continuously passing liquors under high temperature and pressure for delignifying said fibers through said digesters in the opposite direction so that the liquor from each subsequent digester is reintroduced into the previous digester.

2,007,418—Doctor. Sæming Eriksen Akre, Oslo, Norway, assignor, by decree of Court, to Frederik William Vickery, London, England. Application March 23, 1928. Serial No. 264,173. In Norway March 25, 1927. 9 Claims. (Cl. 92—74). In a doctor for the drums of paper-making machines, the combination of a supporting member, a blade, and a pair of elongated resilient strips secured along one side edge upon said supporting member, said strips being spaced apart throughout their length in a part of their width to an extent greater than the thickness of said blade and each having a flat portion contacting with said blade when unstressed over a zone adjacent to the free edge of said strips.

2,008,141—Insulating or "Fish" Paper and Method of Making. James L. McClellan, Littleton, Mass., assignor to Hollingsworth & Vose Company, Boston, Mass., a corporation of Massachusetts. Application March 24, 1931. Serial No. 524,851. 15 Claims. (Cl. 154—34). Method of treating paper, comprising as a step subjecting paper containing true hemp fibers to a parchmentizing treatment.

Where TONNAGE *Counts!*

Alemite Controlled Lubrication Helps to Maintain Exacting Schedules at the Northern Paper Mills



AT LEFT: The dry end of a Beloit Fourdrinier Machine in one of the Northern Paper Mills. Paper travels through this machine at the rate of 1000 feet a minute, or 45 tons a day.

BELOW: Close-up of an Anti-friction Bearing on this machine. These bearings are exposed to heat as high as 200° F., and are lubricated once a week with an Alemite Powergun and Alemite Lubricant.

Alemite Lubricants Provide Amazing Economy Under a Wide Range of Severe Operating Conditions

The Northern Paper Mills are only a few of hundreds of mills in which Controlled Lubrication with Alemite Equipment and Alemite Temprite Lubricants is helping keep maintenance costs down to a minimum.

There are 41 Temprite Specialized Lubricants in the Alemite Line—developed to lubricate perfectly while withstanding extreme pressures, terrific temperatures and crushing loads. And if you feel that your conditions require special lubrication, Alemite Engineers will gladly, without obligation to you, help you analyze your lubrication requirements and develop your own Alemite Lubricant.

Look over your Converting Machines, Dryer Rolls, Jordans, Conveyors, Calenders, Trimmers, and all your equipment. See just what you need, and then send in the coupon. We may be able to save you a lot of money.

ALEMITE CORPORATION
(Division of Stewart-Warner Corp'n.)
1896 Diversey Parkway Chicago, Illinois

★ **ALEMITE** ★
REG. U. S. PAT OFF
Controlled Application of the Correct Lubricant

★ ★ ★
This man is cutting costs in hundreds of paper mills and he can cut costs for you.

ALEMITE CORPORATION, Dept. H
(Division of Stewart-Warner Corporation)
1896 Diversey Parkway, Chicago, Illinois

I accept your free lubrication analysis offer. Please see that I get complete information.

*Name*_____

*Mill Name*_____

*Address*_____

*City*_____ *State*_____

The COMMERCIAL OUTLOOK

New York, August 1, 1935.

THESE are the "dog days" of summer, a period of proverbial dullness for most divisions of the paper manufacturing industry. Demand has let down, buying has been reduced by consumers, jobbers and others, and the market is characterized by the customary seasonal quietness seen during the hot weather months.

Yet, judging from reports and indications along with such statistics as are available, the industry is enjoying broader activity than in any similar period in some years. Most paper mills are keeping fairly busy, and it may be said several branches of the industry are in a far livelier condition than in a lengthy while. Despite the many uncertainties existing, and the numerous obstacles being put in the way of business generally, paper is being produced, marketed and consumed in bigger tonnage than at this season in at least four or five years, with the result orders are finding their way into mills in sufficient volume to justify production on a fairly large scale.

Sentiment within the industry is confident, and steadily improving. On all sides are heard expressions of optimism concerning the fall and late months of the year. Paper manufacturers and distributors expect a marked expansion in business generally and in demand for and consumption of their product once the vacation season is over. Nearly every indication seems to support this view. Some of the basic manufacturing industries already are stepping up output; foreign trade statistics are highly encouraging, showing increases in exports and imports; retail and wholesale merchandise figures are favorable, and the general situation within the country gives every sign of trending in the direction of a substantial improvement in industry and trade later in the year. Some paper manufacturers are said to be so confident regarding the outlook that they are now producing in excess of current orders and adding to their stocks in preparation for the expansion of demand looked for in the autumn.

Several divisions of paper manufacturing are unquestionably busier than in a long while. Foremost among these are roofing felt mills. Repair work and new construction in various sections of the country have increased markedly this spring and summer, resulting in a flock of orders reaching roofing paper plants. It is stated on high authority that this group of mills have enjoyed better business during the last few months than at any time since the start of the depression. Board mills also are well engaged. This might be taken as a favorable harbinger for the remainder of the industry, since demand for boxboard always precedes that for other products of the paper industry, and as there has been a considerable growth in board demand recently, it may be taken for granted mills making other classes of paper will experience a similar increase in the call for their product in the near future.

Some groups of mills are in the throes of summer quietness. Book paper plants are anything but busy, tissue mills are comparatively slow, and fine paper manufacturers are passing through their usual dull season. Taken as a whole, however, the industry is in a fairly active, healthy and promising condition.

An increase of 4.4 per cent in newspaper advertising in June over the same month in 1934 is reported by Advertising Age, in an analysis covering eighty-four cities. Most of the gain was in classified advertising.

Continued decline in newsprint production in the United States in June again more than offset the increase in output of Canadian mills, and as a result output for both countries during the month decreased 1.2 per cent from the total for June last year. Output by Canadian mills rose 2,383 tons to 232,020 tons in June, while mills in the United States produced 77,339 tons, 6,165 tons less than in June, 1934, according to News Print Service Bureau figures. Production for both countries reached 309,359 tons, or 3,782 tons less than a year ago.

For the first half of the current year, Canadian mills produced 23,270 tons or 1.8 per cent more newsprint than in the corresponding period of 1934. During the same time there was a decline in production in the United States of 36,919 tons or 7.4 per cent. Six months' production in Canada was 1,284,903 tons, against 1,261,633 tons in the same time of 1934; that of the United States was 461,552 tons, against 498,471 tons in 1934, and for both countries the output amounted to 1,746,455 tons, compared with 1,760,104 tons in the first half of last year, a decrease of 13,649 tons or 0.77 per cent.

Canadian mills shipped 228,196 tons of newsprint in June, and United States mills shipped 76,985 tons, making total shipments from mills in both countries of 305,181 tons, or an excess of production over shipments of 4,178 tons. As a result stocks at mills in both countries on June 30 stood at 74,267 tons, contrasted with 70,089 tons a month before.

Production of paperboard in the United States in May registered a slight gain over the preceding month and a larger increase over the same month of last year. A total of 262,375 tons of board of all kinds was manufactured by U. S. mills in May, according to Census Bureau figures, compared with 260,851 tons in April this year, and 223,478 tons in May, 1934. The May output brought the total for the first five months of the current year up to 1,312,892 tons, representing an appreciable rise over the 1,176,308 tons in the corresponding period of 1934, and also over the 1,159,610 tons in the first five months of 1933.

Board mills produced at 62.7 per cent of their rated capacity in May last, against 55.4 per cent in the same 1934 month. New orders for board received by mills in May called for a total of 260,015 tons, compared with 255,730 tons in the preceding month, and unfilled orders held at the end of May were for 80,195 tons, against 79,296 tons a month before.

◆ ◆

◆ Chaplin Corp. to Have New Building

Contracts have recently been let for a new building located at Portland, Maine, to be occupied by the Chaplin Corporation for the development and construction of special industrial equipment for the pulp, paper and other industries. Approximately 3,000 square feet of new floor space will be provided with 2,000 additional available in adjacent buildings.

Joseph F. Chaplin of Portland is president and Merle P. Chaplin of Waterville is treasurer.

◆ AT A RECENT meeting of the stockholders of The Reliance Electric and Engineering Company J. W. Corey, sales manager, and S. B. Taylor, works manager, were elected to the Board of Directors.

◆ Farrel-Birmingham Sales Conference

During the week of June 24th the sales force of the Farrel-Birmingham Company, Inc., met at the company's offices at Ansonia, Conn., for the annual sales conference. Sales representatives were present from New York, New Jersey, Buffalo, Akron, Chicago and Los Angeles.

In the absence of the president, N. W. Pickering, who was in Europe, Carl Hitchcock, vice-president, presided at the opening session of the conference on Monday, June 24, and outlined the program that would be followed during the remainder of the week.

The following sessions were devoted to discussions of the company's products, with particular reference to engineering, manufacturing and sales problems involved. New developments and improvements in design which have been made during the past year were explained by the sales and engineering department heads.

Free Flowing

GRASSELLI

TRI-SODIUM PHOSPHATE

A mild alkaline salt for cleaning of felt and all general cleaning purposes. A trial will convince you of its merits.

Other Grasselli Chemicals for Paper Manufacturers

- Acetate of Lead
- Aluminum Sulphate, Commercial
- Aluminum Sulphate, Iron Free
- Aqua Ammonia
- Barium Carbonate
- Barium Chloride
- Barium Sulphate (Blanc Fixe)
- Bleach
- Caustic Soda
- C. P. Ammonium Hydroxide
- C. P. Hydrochloric Acid
- C. P. Nitric Acid
- C. P. Sulphuric Acid
- Muriatic Acid
- Salt Cake
- Silicate of Soda
- Soda Ash
- Sulphuric Acid

Our Research Department may be of help in solving some of your problems. This service is available to you. *Write, wire or phone our nearest branch below.*

THE GRASSELLI CHEMICAL COMPANY
Founded 1839 INCORPORATED **Cleveland, Ohio**

GRASSELLI

New York and Export Office: 350 Fifth Avenue

DU PONT

BRANCHES AND WAREHOUSES:

Albany, Birmingham, Boston, Charlotte, Chicago, Cincinnati, Detroit, Milwaukee, New Haven, New Orleans, Philadelphia, Pittsburgh, St. Louis, St. Paul

San Francisco, 584 Mission Street
Los Angeles, 2260 East 15th Street

Represented in Canada by CANADIAN INDUSTRIES, LTD.
Acids and General Chemicals Division—Montreal and Toronto

Domestic RAW MATERIALS

◆ Papermaking Rags

Roofing grades continue to provide the feature in the papermaking rag market. These rags are moving freely, and are characterized by a decidedly strong price tone. In fact, market levels are gradually ascending, and it would appear as though the advance has not yet spent its force. Roofing felt manufacturers have been enjoying a substantial increase in business this year. Repair work, along with new construction, has led to much larger consumption of roofing, and mills have found it necessary to step up their production operations considerably to supply the felt required.

That the supply situation in roofing rags is bullish, even consumers are frank to admit. The market has been raked over for available lots of such material in recent months, and to add to the strong supply position, imports of these rags from European sources have not commenced to measure up to normal. The situation abroad is that consumption of such rags in the several European countries is on the rise, with the result fewer rags are left for export to the United States.

Foreign roofing rags are selling at prices well above those prevailing on domestic stock, and as domestic rags climb, imported material moves upward in like proportion. The eastern market is slightly above midwestern price levels, indicating a relatively brisker demand in the East for rags than in the West. Eastern mills are paying 1.50 cents per pound for No. 1 domestic classification roofing f.o.b. points of shipment, and possibly in exceptional instances a little above this price, while No. 2 roofing rags are readily bringing 1.15 to 1.20 cents. In the Middle West, prevailing prices are around 1.35 cents a pound for No. 1 stock, and 1.10 cents for No. 2. Foreign roofing rags have brought as high as 1.95 cents a pound ex dock New York basis for linsey garments, 1.45 cents for northern European dark colored cottons, and 1.25 cents for Spanish and Egyptian dark cottons.

The strong position of roofing grades aids, at least sentimentally, other old cotton rags. Whites are in fair demand and selling at an average of 3 cents per pound for No. 1 repacked, and 2.50 cents for No. 2 repacked, while thirds and blues are around 1.40 cents for repacked stock.

Fine paper mills are absorbing supplies of new cotton cuttings in a cautious manner, seldom placing orders for other than directly needed goods. Nevertheless there is a fairly steady movement of some grades into consuming channels, and buyers are meeting firm prices. Exports of cuttings are a factor lending support to market price levels, especially on No. 1 white shirt cuttings which are freely called for by foreign buyers. New York dealers quote 6 cents to a bit higher f.o.b. their shipping point on No. 1 white shirt cuttings, 2.25 cents for fancy shirt cuttings, 4.25 cents for light silesias, 6.50 cents for soft unbleached muslins, 4 cents for blue overall cuttings, 4.25 cents for blue cheviots, 1.75 to 2 cents for washables, and 5.50 cents for bleached canton flannels.

◆ Old Paper

Of all the numerous descriptions of old paper, No. 1 mixed waste paper seems to be selling with greater freedom than any other grade. Board mills are purchasing mixed paper in good tonnage, taking practically all the supply that is becoming available. Several other grades also are moving relatively well. As the summer wears on and consuming mills are due to grow busier, the market likely will develop additional activity.

In the East, No. 1 mixed paper is selling at 22½ cents per hundred pounds f.o.b. shipping points. The market in the Middle West is slightly higher, or 27½ cents at shipping points. Old folded newspapers are in fair demand but not so generally wanted by mills as mixed paper, and are selling at 25 cents a hundred in the East and 32½ cents in the West f.o.b. points of shipment. Another actively sought grade is old corrugated boxes, which are bringing 50 cents per hundred pounds f.o.b. eastern points. Shavings are in comparatively slow call yet are holding their price levels at 2 to 2.25 cents a pound for No. 1 hard white, and 1.60 to 1.75 cents for ordinary No. 1 soft white, with No. 1 hard white envelope cuttings quoted by dealers at 2.25 to 2.35 cents per pound. Old No. 1 kraft paper is firm at 90 to 95 cents per hundred pounds, and heavy books and magazines are priced at 50 to 55 cents f.o.b. dealers' points.

◆ Pulpwood

Pulpwood is reported moving steadily to pulp mills against contracts, though the market is showing rather limited current activity. No changes of note are recorded in ruling market quotations.

◆ Rope and Bagging

Reports divulge a good paper mill demand for old bagging but little activity in the old rope market. Signs are most consumers are amply supplied with old manila rope, and dealers say offerings to mills seldom bring the desired response. Prices are mainly nominal at about 1.75 to 2 cents per pound f.o.b. shipping points for No. 1 domestic old manila and 1.90 to 2 cents ex dock New York for No. 1 foreign rope. Scrap burlap bagging of No. 1 grade is reported fetching 1.40 cents, and probably higher in some instances, at dealers' shipping points, while roofing bagging is selling at a cent per pound and possibly a shade above this basis f.o.b. points of shipment. It is asserted by dealers and importers that purchases of bagging are difficult to effect, owing to very restricted supplies now available. Old gunny bagging is quoted at 1.50 cents for domestic and 1.60 cents for foreign, f.o.b. shipping points and ex dock New York, respectively.

◆ Mechanical Pulp

The market for mechanical wood pulp is anything but active. Domestic and Canadian producers are said to be somewhat up against it finding a consuming outlet for their pulp, since competition from Europe has increased. Scandinavian groundwood is being shipped to the United States, particularly to Lake ports, in considerable tonnage, and is displacing domestic and Canadian pulp in some cases. Manufacturers in Canada are said to be especially affected, and, in certain instances in an effort to keep their mills operating, are pressing fairly hard for orders. There are reports of Canadian mills selling prime groundwood at as low as $13 and $14 a ton f.o.b. grinding points, though of course this level is below prices usually quoted. Domestic groundwood is around $21 or $22 per ton f.o.b. pulp mills for such limited-sized lots as are selling in the open market. Canadian groundwood is reported offered at New York and other Atlantic seaboard points at around $23 a ton for pulp brought down by schooners.

◆ Chemical Pulp

Generally domestic pulp manufacturers are adhering to steady quotable levels on their product even though the market is developing little life of much consequence. Indications are paper and board mills are fairly well supplied with pulp on hand or on order, and are little disposed to add to their purchasing commitments at present. However, producers are shipping steadily against contracts and back orders, and it is asserted that only in rare instances are price concessions being allowed. Bleached sulphite is quoted 2.50 cents upwards per pound, depending on grade, ex dock Atlantic seaboard basis, and strong unbleached sulphite at 1.85 to above 2 cents, on a similar basis. Domestic bleached soda pulp holds to 2.50 cents a pound delivered book paper mills, and domestic or Canadian prime kraft pulp is about 2 cents delivered consuming centers.

◆ Chemicals

Prices of casein are again slightly lower at 10.50 cents per pound for the domestic standard ground and 11 cents for finely ground, with foreign on a range of 12.75 to 13.25 cents. Bleaching powder is steady in price at 1.90 to 2.10 cents a pound f.o.b. works. Caustic soda and soda ash are quotably maintained.

THE DRAPER FELT

Unexcelled for strength, openness, resiliency, and general running qualities. Made to meet the most exacting conditions on all types of machines and all kinds of papers. Only one grade and that the highest.

Made by

DRAPER BROTHERS COMPANY

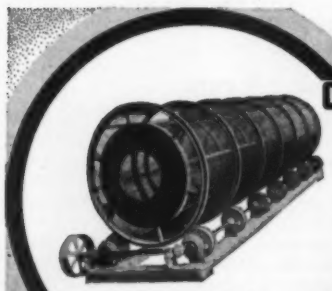
CANTON, MASS.

Woolen Manufacturers Since 1856

REPRESENTATIVES

L. H. BREYFOGLE, Kalamazoo, Mich. C. K. BEECHER, Delaware, Ohio

PACIFIC SALES COMPANY, Security Bldg., Portland, Ore.



CHIP SCREEN

Ask OUR ENGINEERS to help SOLVE YOUR Problems

Paper Mill Equipment

Flat Pulp Screens	Paper Machine Drives
Winder Shafts	Refiners-Hydrators
Cylinder Moulds	Gate Hoists
Deckers	Grid Unit Heaters
Roll Heading Machines	

Pulp Mill Equipment

Agitators	Rotary Incinerators
Flat Screens	Disc Evaporators
Deckers	Recovery Systems
Sulphur Burners	Grid Unit Heaters

Wood Room Equipment

Slashers	Chippers
Barking Drums	Chip Screens
Wood Cleaner	Chip Crushers

Equipment must keep in step with the modern advancement of the paper industry. Our engineers are constantly working toward that end, and paper making problems are anticipated by them. Write for descriptive folder on any particular machine or the complete Murray line—or tell us your problem.

D. J. Murray Mfg. Co.

WAUSAU ~ WISCONSIN.

7 Reasons Why

you should investigate

The Vortex Painting Method

1. The Vortex Painting Method gives you the best possible paint job—at the lowest possible cost.
2. Vortex specially compounded, heavily pigmented paints insure high covering capacity—give maximum life on brick, steel, wood or concrete surfaces—no peeling.
3. Vortex Paints and the Vortex Painting Method are accepted as standard by scores of the country's biggest and best informed industrial organizations.
4. Special equipment furnished—no investment—no outside labor necessary.
5. No interruption of production schedules—no scaffolding needed for usual ceiling heights.
6. Special nozzle construction reduces mist and spray to a minimum.
7. Full details on application. No obligation.

Write for Descriptive Literature

THE VORTEX MANUFACTURING COMPANY

1975 West 77th St., Cleveland, Ohio

Import and Export MARKETS

IMPORTS

◆ Wood Pulp

While it is generally acknowledged the market for imported wood pulp is quiet, the undertone is steady and quoted prices are fairly well maintained. There are some out-of-the-way instances where sellers are shading recognized market rates, evidently as an inducement to consumers to buy, but most producers are quoting firmly and evince no disposition to digress from the prices which have prevailed for some time as established market levels. At best, the concessions allowed in some quarters are slight, seldom amounting to more than a dollar or two per ton, and apply only to certain classes of pulp.

• Indications point to pulp mills in Scandinavia and elsewhere in Europe being well sold up, particularly for this year. Importers and agents say there is limited tonnage still available for shipment during the remainder of 1935. On the other hand, there is reason to believe purchases for next year have not been up to the volume ordinarily seen by this time, reflecting the fact that paper and board manufacturers have not been inclined to contract ahead with the future presenting so many uncertainties.

Bleached sulphite of foreign prime grade is quoted at 2.50 cents per pound ex dock American Atlantic seaboard basis, with prices ranging upward from this level, depending on the quality of the pulp involved. It is said some offerings of bleached are being made at a shade under the 2.50 cents basis, but most importers and agents contend pulp offered cheaper really is of secondary grade. Prime strong unbleached sulphite is 1.90 to 2.05 cents ex dock, according to quality. Some purchases have been recorded at 1.85 cents and possibly at slightly less, though again it is the insistence of a majority in the trade that unbleached bought under 1.90 cents is of half-prime or inferior grade. Kraft pulp exhibits greater price firmness than sulphite, and prime Swedish kraft is fully established on a level of 1.70 cents ex dock. Imported groundwood is $20 to $21 per ton for dry and about a dollar a ton lower for moist ex dock Atlantic seaboard.

Imports of pulp into the United States scored a sharp increase in May over the preceding month and also over the similar month last year, reaching a total of 147,686 net tons of 2,000 pounds, air dry basis, of chemical grades, valued at $4,693,031, compared with 77,109 net tons of a value of $3,373,263 in April this year, and 112,041 long tons of a value of $4,512,612 in May, 1934, according to U. S. Department of Commerce figures. The May imports brought the total for the first five months of the current year up to 588,782 net tons, against 532,238 long tons in the corresponding period a year ago. The May imports were larger than in any previous month this year with the exception of January, when 160,103 net tons were imported.

◆ Paper Stock

Imports of papermaking rags into the United States in May last showed a 10 per cent decrease compared with the preceding month but were 70 per cent above the May, 1934, receipts. Imports of other waste stocks were 65 and 51 per cent, respectively, above those of the other two months mentioned, while imports of pulpwood showed increases of 40 and 59 per cent, respectively. Imports of rags for paper manufacture amounted to 17,195,176 pounds in May, valued at $209,220, against 18,830,249 pounds of a value of $190,256 in April this year, and 10,159,072 pounds of a value of $153,153 in May last year, making a total for the first five months of the current year of 67,584,267 pounds of a value of $707,640, against 45,215,920 pounds of a value of $557,003 in the corresponding period of 1934. Imports of miscellaneous paper stock, embracing old rope, old bagging, waste paper, etc., were 8,964,943 pounds of a value of $115,834 in May last, making a total for the first five months of this year of 29,929,700 pounds of a value of $414,488, contrasted with 26,955,713 pounds of a value of $405,064 in the similar time a year ago. Pulpwood imports during the first five months of the current year totaled 248,984 cords of a value of $1,513,747, against 146,637 cords of a value of $905,693 in the same period of 1934.

◆ Paper

Imports of paper and paper products into the United States were 22 per cent higher in value during May than in the preceding month and 12 per cent above the May, 1934, receipts. While this increase was largely due to a rise in newsprint imports, which represent 85 to 90 per cent of this country's imports of paper, larger shipments of boards and other printing papers also contributed. Imports of kraft wrapping, writing, surface coated and cigarette papers, while exceeding last year's receipts, were somewhat lower than in April. Total imports of paper and paper manufactures were valued at $8,925,912 in May, compared with $7,333,474 in April this year, and $7,935,237 in May a year ago.

EXPORTS

Exports of paper and paper products from the United States during May registered a slight decline in total value as compared with the preceding month, although the aggregate value was 10 per cent above the May, 1934, shipments. Nearly all the individual items showed a rise in volume over the corresponding month last year, with the largest gains occurring in shipments of newsprint, book papers, overissue news, tissues and crepes, writing and wrappings. Exports of boxboards were less by 45 per cent, and paper bags by 9 per cent. Exports of paper towels and napkins, fiber insulating boards, envelopes and cash register rolls also declined.

Compared with the April exports, shipments of newsprint, overissue news, greaseproof and waterproof papers surface coated papers, and tissues rose, while exports of writings declined 5 per cent, book papers 26 per cent, and wrapping papers, exclusive of greaseproof, 1 per cent. Exports in the board group, with the exception of bristols, were also generally lower than in April, notwithstanding that shipments of miscellaneous boards were up about 50 per cent compared with last year.

Total exports of paper and paper products in May were valued at $1,604,184, contrasted with $1,692,976 during April this year, and $1,456,078 in May, 1934. The May shipments brought the total for the first five months of the current year up to a value of $8,360,096, against $7,525,751 in the corresponding months of last year.

Exports of newsprint were valued at $94,520 in May, against $73,147 in the same month of 1934; of wrapping paper, $144,880, against $102,577; of uncoated book paper, $75,348, against $58,258; of writing paper, $152,777, against $95,868; of tissue and crepe paper, $59,460, against $44,174; of sheathing and building paper, $28,753, against $19,196; of toilet paper, $53,010, against $46,588; of boxboard, $104,310, against $116,392, and of other paperboard, $96,638, against $56,039.

Exports of paper base stocks continued to show an upward trend in May, amounting in value to $835,471, compared with $798,774 in the month preceding and $496,955 in May last year. These gains were almost entirely due to heavy increases in shipments of sulphite pulp, which rose from 5,483 tons last year to 11,518 tons during April and 12,623 tons in May of this year. Shipments of rags and other waste for papermaking were 24 per cent under the April exports.

ADVERTISING PAGES REMOVED

F.C.HUYCK & SONS

KENWOOD MILLS

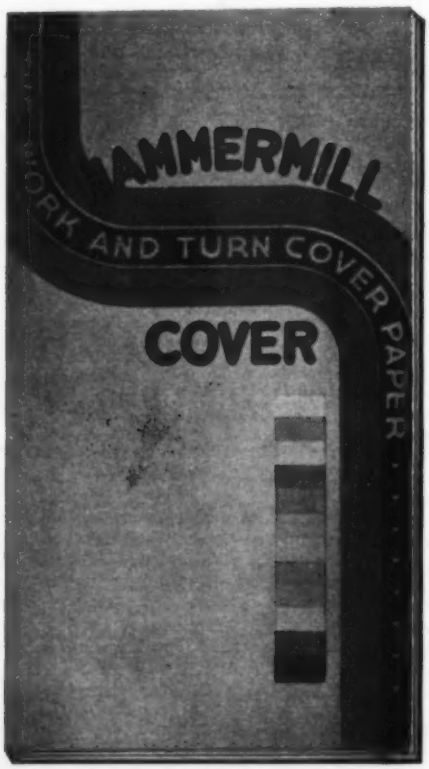
ALBANY, N.Y.

KENWOOD WOOL PRODUCTS REG. U.S. PAT. OFF.

Manufacturers of Kenwood Felts and Jackets for all Pulp and Paper Making Purposes since 1870

KENWOOD MILLS LTD. ARNPRIOR ONTARIO, CAN.

TAPPI FALL MEETING ◆ PHILADELPHIA and ATLANTIC CITY ◆ SEPTEMBER 18, 19, 20, 21, 1935



We repeat . . .

"If you don't make Cover Paper"

Let us remind mills not making cover-paper that Hammermill Cover offers you an exceptional combination of qualities that made it a leader in the cover-paper field.

COLORS: An even dozen — fast to light and practical for printing — uniform on both sides in press performance and appearance.

SURFACES: Nine in all, Antique, Ripple, Plate and Crash in the regular line and Crepe, Morocco, Brushmark, Cloud and Heavy Leather in the de luxe line. The price of Hammermill cover is low because of volume production and standard manufacturing methods.

For your pocket or desk there is a handy little booklet — mail the coupon for it.

Hammermill Paper Company,
Erie, Pa.

Please send 6¾ envelope size booklet showing the color range and specifications of Hammermill Cover, "the work-and-turn cover paper."

Name .....

Position .....
(Please attach coupon to your business letterhead)